

ORAL HISTORY PROGRAMME, ENGINEERS AUSTRALIA

INTERVIEWS WITH MR WILLIAM HAROLD CLOUGH¹

at 117 Broadway, Nedlands, Western Australia
on 13 February 2009, 20 March 2009
and 24 April 2009

Interviewer – Richard G. Hartley

Tapes 1, 2, 3, 4, 5 and 6

Tape 1, Side A

minutes

HARTLEY 00 This is Richard Hartley interviewing Mr Harold Clough in his office at 117 Broadway, Nedlands on Friday, 13th February 2009 for the Oral History Programme of Engineers Australia.

Mr Clough, or may I call you Harold?

CLOUGH Certainly.

HARTLEY To start our interview, could you please tell me your full name and when and where you were born?

CLOUGH My full name's William Harold Clough and I was born in Perth on the 30th September 1926.

HARTLEY And your father was a building contractor, I believe.

CLOUGH That's right.

HARTLEY What was his name?

CLOUGH John Oswald Clough.

HARTLEY And your mother?

CLOUGH 01 My mother was Lucy Hayes and – should I keep on talking?

HARTLEY Yes, yes. As you like. Where did they live?

CLOUGH We lived at 87 Archdeacon Street, Nedlands at the time I was born until I left home.

HARTLEY So where did you go to school?

CLOUGH I went to Nedlands Primary School until I was twelve and then Claremont Central School for three years to fifteen and then to Scotch College for a year

1. This a verbatim transcript of the interviews with Mr Clough. Corrections and deletions have been made in accordance with requests made by Mr Clough in August 2009. RGH 15.9.09

when I was sixteen. And when I was seventeen, I worked for a year at the AMP Society.

HARTLEY The AMP?

CLOUGH 02 The AMP Society.

HARTLEY Oh did you?

CLOUGH As a junior mail clerk.

HARTLEY That put you off the insurance business, did it?

CLOUGH Completely and absolutely! Perhaps I should go back there, if you wish, and tell you where my father and mother came from.

HARTLEY Yes, that would be interesting.

CLOUGH 03 My father's family came from Westgate Wearsdale in Durham, England and my grandfather, William Clough, was a miner and came out to Australia – when would that have been? About 1880 or thereabouts, I guess. I am not sure about that. My father was born in Richmond, Victoria.

HARTLEY Was your grandfather a coal miner or was he in gold mining?

CLOUGH I don't know. He was probably a coal miner.

HARTLEY Yes.

CLOUGH 04 My father was born on the 2nd April, 1887 in Richmond, Victoria – suburb of Melbourne. When he was about six or seven, his father, my grandfather, joined a company called Mascotte Gold No Liability, I think that was it, registered in Ballarat, in which he was a director and shareholder and mine manager. The company was financed to the tune of £38,000 to treat sulphide gold ore that was being mined close to Dark River in northern Victoria.

HARTLEY That's Dark, is it? DARK?

CLOUGH 05 It was then DARK. Subsequently, it was changed about 1900 to Dart – DART – and it feeds into the Dartmouth Dam which you might have heard of in northern Victoria.

HARTLEY Oh yes.

CLOUGH A lot of miners were mining gold, or finding gold, in northern Victoria at the time, but they could generally only treat the oxide gold which was near the surface. As soon as they went deeper, the gold changed to sulphide gold and they didn't have methods of treating it at that time. One of the shareholders of Mascotte Gold Mine was the fellow called Edwards, who developed a tilting hearth furnace.

HARTLEY Oh, Edwards Roaster.

CLOUGH You know of it.

HARTLEY Oh yes. Famous.

CLOUGH 06 Well one of the first Edwards Roasters was installed in the Mascotte Gold Mine at Dark River about 1896, I think, by which time, my father would have been nine. We got interested in this because ten years ago my sister found a letter that he had written when he was nine, in 1896, to an aunt who was living in Chiltern, which is also in northern Victoria. He spoke about the inspector coming to the school when he'd passed into third or fourth grade. It was very much a schoolboy letter, you know, dear Aunt Ada, I hope you are well. Last week the inspector came to the school and I passed into, I think it was, third grade. Then he went on to say that every week he has to go to the Mascotte and to get there he has to go up a mountain and down a valley and up a mountain and then down a valley until he gets to a precipice leading down to the tramline that leads to the huts. And we read this and had no idea what the Mascotte was and, when I first read it, the only thing I could think of was he must be going to another school. So I rang the Education Department in Victoria and got a very bright girl who was obviously sitting at a computer, because she was the historian of the Education Department. I asked her if they ever had a Mascotte school. And she said, no, there has never been a Mascotte school in the Victorian education system, but they did have a Dark River school that opened, I think, in 1896 and closed in 1902. So it was only open for six years.

HARTLEY They ran out of pupils.

CLOUGH 09 Yes. And then she sent me an extract from, that someone had written a history of schools in Victoria. It had this article about the Dark River School, about when it opened and when it closed and so on, but also an extract of a letter that the headmaster, and only teacher, had written to the Director of Education and it said that he was applying for a mountain allowance, because if you taught in a school in the mountains, you got a shilling a month extra pay. And he wrote to the Director of Education saying that the Dark River school was very much in the mountains and the only access was by pack horse which was twenty miles over the mountains to Cravensville, which was the nearest town. And he said. 'During winter, the snow is so deep that the pack horses can't get through and we have to live for three months on tea and bread, not even potatoes'.

HARTLEY Oh, good heavens!

CLOUGH 10 And the Director wrote back, "application denied". It wasn't tough enough. They were still getting bread. [Laughter] Bread and tea. Anyhow, that interested us. The same woman said that there would be a lot more in the Victorian Archives about the school and they will even have lists of students and that type of thing. But she couldn't get it for me, but if I went to the Archives, I could find it, and I said, well, it is not easy because I am in Perth. So she gave me the name of a Melbourne historian who went and did it. Did a wonderful job for practically nothing. I got all the teacher's reports listing all the students with my father and his older brother and younger sister as students and there were only eight or ten kids in the classes but, more importantly, it also said where the students lived in respect to the school. And there was also another article she sent me on the first teacher that came who had to decide where to locate the school. And she also looked up Mascotte and found out that Mascotte was a gold mine and about two or three kilometres south of Dark River. So we then worked out that my father must have been going to see my grandfather, his father, taking stuff for him to the gold mine where he was working. And what they were doing was they were

mining gold in the Mascotte mine and then carrying it by pack horses over the mountains to the Edwards furnace, which was set up at Dark River.

HARTLEY At where?

CLOUGH At the Dark River.

HARTLEY Oh yes.

CLOUGH 12 And treating the ore there. So about ten years ago, my wife and I and my sister and her husband and three or four other people went across and we found a most interesting guy who had been the Forest Department ranger for the area and he was a very keen historian, who volunteered to take us in and show us where it was. It was certainly remote. You could certainly only get in on a 4WD vehicle and even then it was difficult. It is right up in the mountains. The mountains are very steep, very heavily timbered, and it is about 20 or 30 kilometres south of Corryong, which is on the Victoria and New South Wales border on the Murray River. And Corryong's claim to fame is that it is the home to the Man from Snowy River.

HARTLEY Oh, is it?

CLOUGH 14 And it is very much Man from Snowy River country. Very steep, very rough. So we went in there and we found the Edwards furnace. It is still largely intact.

HARTLEY Was it really?

CLOUGH Well it is so remote that how they got it in on bullock drays, I hate to think.

HARTLEY Well, a lot of it was brick, I should imagine. They used a lot of brickwork to build around the furnace.

CLOUGH Oh they did, and that was still there. And there was a boiler and stamp battery and the other things that went with it. A lot of broken acid jars, because the process was they took the ore from the mine and put it on pack horses, packed it up and down the mountains for two or three kilometres to the Edwards furnace, dumped it into the Edwards furnace and fired the Edwards furnace with timber. It was a reverberatory furnace and how much it tilted along its length and the scrabbles operating in the furnace determined how fast the ore went through. The idea was to burn off the sulphur in the ore and then the roasted ore that came out at the end went into a big tank where it was treated with acid and from that they then precipitated the gold. They produced several thousand ounces of gold but it took my grandfather about eight years to spend the £38,000 and send the company broke.

16 On our visit we found the site of the schoolhouse and from that we found the site where my parents had lived. They were all timber slab huts with bark roofs, dirt floors, but each had a fireplace in stone, which was still there. And you could identify the school site and the house site and so on, not because there was anything of the house left, but the level pad they had made on which to build the house, they had to cut into the mountainside, so one side was very steep and the other side was built up with rock and with both the school and the house, you could clearly identify where the house was by where the fireplace was. The school also had a fireplace in it. Yes it gave us a good idea how our parents lived up in the mountains. I must say I gave great credit to my grandmother who must have lived there with the only access, I

would say would have been 20 miles by pack horse, it would take a very full day to ride out. We drove as close as we could drive to the mine and on the map it was only about half a kilometre away and I reckoned I could easily walk that, but the trouble was ...

HARTLEY That's as the bird flew!

CLOUGH 18 No. The trouble was it was half a kilometre away but about 500 metres at a lower level. It was very, very steep going down and I got down all right. Coming up was something else. You were pretty much on your hands and knees to get up. It was one metre forward and half a metre back all the time. Anyhow, we did get in to see the mine. And how the original prospectors got in there and lived in there beats me. They must have been awfully tough.

HARTLEY Yes, yes. When did your father come over to the west?

CLOUGH Well, in 1902 the mine went broke and I think they just walked out. And the whole family came to Perth and they lived in Albert Street in Mosman Park. I did see the house they lived in before it was demolished 20 or 30 years ago. Now it is a block of flats, but it is only about half a kilometre from where we are living now.

HARTLEY You haven't moved very far.

CLOUGH 20 We haven't moved very far. So my father was about thirteen when they came over. I don't know whether he went to school here or not – probably he did for a year or so. But then as soon as he was able to, he left school, got apprenticed as a bricklayer and worked as a bricklayer locally. I remember him telling stories about how, as bricklayers, they used to wait at the station for the trainloads of bricks to come in and the bricks were unloaded from the train wagons onto the siding and then put into horse drays to go out to the sites. Then they used to follow the bricks out to the site and see if they could get jobs as bricklayers. That's how you found work. Where there were bricks, they needed bricklayers.

HARTLEY Yes. So how did your grandfather earn his living when he came here?

CLOUGH Soon after they arrived in 1902, he went up to Kalgoorlie and he was up there for a period – not long, six months or something but he got ill, came back to Mosman Park and died there about, I think, 1904. If dates are important, I can look them up and get them for you, but these would be like within a year or two - my sister's got all this stuff set out in detail: when they arrived in Australia, when they got married, when they died, where they lived – all that sort of thing.

22 Anyhow, my father tells the story about being woken up by his mother who said, 'Jack, you have got to run to Claremont and get the doctor because I think your father is dead'. And so, he ran from Mosmans to Claremont and got the doctor and said, 'Come quickly, Doctor, I think my father's dead'. And the doctor said to him, 'well, if he is dead we don't need to hurry, do we?' Which wasn't exactly a sympathetic reply but that's what he said.

HARTLEY So who looked after your grandmother while your father was at school?

CLOUGH I've got no idea. He had an older brother, Bill, who was two years older and he would have been fifteen and he was a carpenter. I guess the kids worked

and supported their mother, I would think, or she'd have to support herself. I really don't know. But I would say they lived pretty modestly.

HARTLEY Yes, tough times.

CLOUGH 24 Tough times. When he was in his early twenties, he went to Melbourne and worked as a bricklayer in Melbourne. He told some interesting stories of working in Melbourne. One story he told was [about when] they were building a multi-storey building. In Melbourne, in those days, the brickwork supported the building. It was structural brickwork, which meant they'd start off 18 inches or 21 inches wide and build the inside – it was all carried on the inside leaf, and they'd put just a four and a half inch thick waterproof leaf on the outside. They'd go up three or four storeys in brickwork to support the building. And he said that he was working on this building in the centre of Melbourne when the owner of the block next door, I think, realised they were encroaching on his land but he waited until they had finished and then sued them because they were two inches over into his land and wanted a hell of a lot of money for the two inch strip. And the owners he was working with argued about this but he was adamant and they had no where to go, so he was sent back to cut off a two inch strip. He said, obviously we couldn't do that. We just took the whole four and a half inch leaf out and left it without a water proofing and he said the interesting thing about it, a year or two later, the owner that had tried to extort them for money for the two inch strip, he came to build, and when he came to build, he built hard up against their block and when he'd finished, he was three inches over into their block! So then they sued him for the three inch strip and he couldn't get in to take it off, so he had to pay. The moral of the story is, don't be greedy!

HARTLEY And get a good surveyor!

CLOUGH 26 And get a good surveyor. After a couple of years in Melbourne, he came back to Western Australia and went to work down in Narrogin. I never quite worked out why he went to Narrogin but he lived for several years in Narrogin as a bricklayer, played football for the Narrogin Football Club. But then in 1914 when he would have been 27, as soon as the war was declared, he joined up and went to Blackboy Hill.

They were camped at Blackboy Hill for probably four or five months and he said that it was pretty rough. And there he met Bill Hayes who was my mother's brother and Bill was about six years younger than he was and worked in the tax department as an accountant or some such thing. But Bill told me that when he was there, he said it was really a rough camp and he was much smaller than my father who was a big man and having worked, I imagine at 27 as a bricklayer, not only was big but was strong. Bill said, he quickly decided he'd like to get behind this bloke when there was a fight on, so they became good friends in Blackboy Hill. I think, at that stage, Bill who lived in Leederville with about six or eight of his family members including a number of sisters, took my father home and that's where he met my mother.

28 Her family were Hayes and they were Irish and came from Northern Ireland and came out about the same time as my father's family had but settled in a farming town in Victoria at Landsborough it was just out of Ballarat. But she came from a family of twelve. She was the second youngest and Bill Hayes was the youngest, but they had five or six brothers and five or six sisters too. So I had lots of aunts and uncles as I grew up.

minutes

- 29 My father and my uncle together went away to Egypt in early 1915, landed at Gallipoli on the 25th April, and my father was there until they retired defeated, but my uncle had only been there a few months, and they were in the artillery and worked on, in those days, 18 pounder guns. My father had been working on the gun which got hit by an eight inch German shell, a direct hit that killed two or three of the crew and injured several others just 10 minutes after he had been relieved, so he was lucky. My uncle wasn't killed but he was severely injured, particularly in his left leg and his left knee was shot away. So when he was injured, he was taken out to a hospital ship that they had moored off ANZAC Cove.
- 31 My uncle told the story that he was on the hospital ship. When my father inquired about how his mate, Bill Hayes, was who'd been carried out to the ship, the army couldn't tell him anything, of course, so he didn't know. All he knew he was out on a ship a mile or two off shore so as soon as he got some time off, he said he stripped off and swam out to the ship and climbed aboard. Didn't get into trouble for swimming out to the ship but got in trouble because he was naked and there were nurses on the ship. But in any case he saw his mate and so on. Bill got taken to England and spent some time in hospital there and then got repatriated back to Australia, so he got back late 1915, early 1916. It was interesting because, as I said, he lived next to us at home in Archdeacon Street and he used to take us swimming down at Cottesloe every morning before work.

End of Tape 1, Side A

Tape 1, Side B

minutes

- CLOUGH 00 When he stripped off, the whole of his left side was pot marked with shrapnel scars and he could never bend his left leg. His left knee had been – yes, he didn't have a left knee and they had just frozen it there.
- HARTLEY Did he still work as a carpenter?
- CLOUGH No. Bill was never a carpenter. My father's brother, Bill, was a carpenter. This Bill was Bill Hayes and he'd worked for the taxation department before he went to war and, I think, when he came back he went back to the taxation department and continued working.
- 01 But shortly after, probably shortly after the war, he set up an accounting practice and had an accounting firm, W. Hayes and Co., with an office in the Terrace, and did particularly well. Bill was very smart. Looking back, if he was living today, he would have been looked upon as a merchant banker because what he used to do, he used to put his clients together – the ones that had money and the ones that needed money and act as a go-between between them and he did particularly well. I think because he did those things well. But my father came out of Gallipoli when they closed that down, went back to Egypt for a short while, and then to France. So he arrived in France in the late 1915s and spent the rest of the war in France, got gassed rather badly at one stage and injured, and was repatriated back to England, spent some time in hospital and then went to an officers' training school at Lords, the cricket ground. I remember we had a photograph of all his class at Lords – there must have been a hundred of them – and came out as a Second Lieutenant or

something like that. Anyhow, he got a commission at that stage, which would have been late 1917.

HARTLEY What brigade was he in?

CLOUGH 03 He was in the 8th Battery, 3rd Field Regiment.

HARTLEY Oh.

CLOUGH Oh, 3rd Field Brigade in those days. Actually, what I have read which is tremendously interesting and which my cousin has – this is Bill's daughter – is a diary Bill Hayes kept when they were in Egypt and when they landed in ANZAC. It goes right up to when he was injured. And he was 21 at the time or something like that. But it was amazing reading the thoughts of a 21 year old in a very difficult war situation.

HARTLEY Yes.

CLOUGH 04 You know, it was half excitement and half horror. Excitement over what they were doing, and horror because people he knew were getting killed.

HARTLEY Yes.

CLOUGH Very interesting diary.

HARTLEY Pity he didn't carry it on when he went to France.

CLOUGH No, this was Bill kept it, not my father.

HARTLEY Oh, I see, yes.

CLOUGH And he carried it on until he got injured and then, well. He wrote when they were still in Egypt and all the time for the month or two he was in ANZAC Cove. Yes.

HARTLEY How did your father get on when he came back?

CLOUGH 05 All right. Well, the war finished on the 11th November 1918 and after that they got sent back to the UK and I think he got back in April 1919. Shortly after he got back, he joined up with his brother, Bill, who was a carpenter, and formed Clough Brothers as builders and they were building houses. At that time, they built a section of the Nedlands development and at that time also – let me think, I was born in 1926 – about 1920, he would have married my mother and they had three children.

06 The oldest one was injured at birth and died when she was about five. She was born about '24, I guess, because I can remember her, but only just, that she was probably about three when I was born. And then I've got a sister who was born a couple of years later. She is still alive and well. And so we grew up in Archdeacon Street, Nedlands and I went to kindergarten at the local church at the top end of Archdeacon Street, on the corner of Archdeacon and Elizabeth Street. Then at five or six, I started at Nedlands Primary School and went through there until I was twelve. I then went to Claremont Central School and was there ...

HARTLEY Why did they call it Central School?

- CLOUGH Claremont Central. It was because in those days they had a lot of primary schools which went up to I think it was year twelve, when you were in grade six anyhow. Oh sorry, when you were twelve years old.
- HARTLEY Yes.
- CLOUGH And then they fed into a central school which took you from ...
- HARTLEY Oh, I see, yes.
- CLOUGH Claremont also had a primary school but the secondary school was for children aged twelve, thirteen and fourteen. I think when you were thirteen, you could leave school and, in those days, at least half the students left as soon as they could and went out and worked. That was done.
- HARTLEY So you went to Scotch after that?
- CLOUGH 08 I was twelve, thirteen, fourteen at Claremont Central. I was fifteen. I was twelve when I left Nedlands. Thirteen, fourteen, fifteen, I was at Nedlands. Sixteen, I was at Scotch. Seventeen, I was at the AMP and eighteen I started at the university.
- HARTLEY Was it a very different atmosphere at Scotch College after the Central School?
- CLOUGH Well, the war was on.
- HARTLEY Oh yes.
- CLOUGH 09 And my father had, as I said, started as a builder with his brother. In 1930, the depression came and there was no building work, so they were out of work. His brother, Bill, the carpenter, William Edwin Clough, he had four children. In 1930, the only thing that was active was the gold mining industry. The only thing you could sell in 1930 was gold. They couldn't sell wheat, they couldn't sell wool, but the bank would always take gold, so gold was the only thing you could be sure you could work on and sell. Bill went up to Marvel Loch, just outside Southern Cross and mined gold as his father had.
- HARTLEY Oh yes.
- CLOUGH And became mayor of Marvel Loch and ran the battery at Marvel Loch and became quite a figure in the community.
- HARTLEY The battery manager was an important person.
- CLOUGH 11 Yes. His son, Jack, who was a year or two older than me was with him. I will come back to that because we did go to see them after that. But I was twelve when the war started. My father in 1930 when there was no building work, I think as much as anything to keep himself busy, joined the militia and did part time army work and got what work he could, but very little. During the depression, we – we were poor.
- HARTLEY Yes.
- CLOUGH But managed to survive. But my father did a lot of work on his militia stuff and so progressed and went from a lieutenant, which was what he had left the army as, to a captain and then to a major.

HARTLEY Oh really?

CLOUGH And at that time, Athol Hobbs, who was John Hobbs' son.

HARTLEY He was an artillery man, wasn't he?

CLOUGH Sir John Hobbs had been a hero in the First World War. His son, Athol, was an architect, but was also in the militia with my father. And he was a colonel. My father was a major. But they worked a lot together. Because my father had the great advantage that he had had four years at war. Athol had only got into the army after the war and my father knew a lot more of the ...

HARTLEY What war was really like.

CLOUGH What war was really like as distinct from the peace time soldiers that were learning, and so they were as different as chalk and cheese because Athol Hobbs was a very up market architect. My father was a lowly builder, a bricklayer. I think, as much as anything, through necessity they formed a relationship and that carried through until '39.

- 13 As soon as war was declared, they both went into the permanent army and early in 1940, Athol Hobbs, as the Colonel, took the 2nd 3rd Field Regiment of artillery to Egypt. My father wanted to go, but they said he was too old at (I don't know what he would have been then. Let's think, oh yes, he would have been 53, 54). Yes.

He'd tell stories about when they went for the medical to go away with the regiment as he'd applied to go with them. He was concerned because he knew he had tendencies to diabetes and among other things they tested your urine for this, so when he went to do his test he went through with – not John Fitzhardinge, his brother from the Commonwealth Bank – Roger Fitzhardinge. When they went to give their urine, he got Roger to give him his, so he put Roger's in as his. He passed his urine test but he still didn't get to go away.

HARTLEY Now, I wonder how many people did that?

- CLOUGH 16 Well, I wonder. But Roger always told the story that you can't get closer to a fellow than share your urine with him! Anyhow, my father was then promoted to colonel and became commanding officer of the 3rd Field Regiment Reserve that was being trained to supplement and reinforce the regiment that had gone overseas. And up until that time, which was in the forties, the regiment was still equipped with 18 pounder guns with steel wheels drawn by horses.

HARTLEY Oh really?

CLOUGH Yes.

HARTLEY Wow.

CLOUGH But in 1940 they got 25 pounder guns and they got Marmon Herrington tractors to haul them and they became mechanised. I think my father was more at home with the horses because he'd grown up on horseback and ridden all his life. But, I remember when I was a kid before the war had started, the artillery had a big team of horses to draw the guns and the officers all rode horses and so, and they were all stationed down at Karrakatta, at the barracks down there. And periodically, they used to go for rides down to the ocean and around and back again, teaching the officers one

thing and another, apart from anything else, how to ride a horse! I remember a couple of cases, my father taking me with him and I joined them and rode down there. I used to think it was wonderful.

- 18 But by 1940, perhaps even '41, they were in camp at Naval Base and I went down there and spent my school holidays with my father then. He was commanding the regiment.

HARTLEY Sounds highly irregular to me. [laughs]

CLOUGH Oh completely illegal, but then I remember in '41, he was down at Narrogin where they had a big camp. The artillery was placed at Narrogin and they all lived in tents. They were by then mechanised. And I went down and stayed with him, I remember, on my long vacation then, six or eight weeks or something. I got issued with a uniform and I went out with the troops and I learnt to drive, driving a Marmon Herrington tractor pulling a gun and trailer.

HARTLEY Wow. So what was the prime mover?

CLOUGH Marmon Herrington tractor. They were a truck tractor type of thing.

HARTLEY How do you spell that?

CLOUGH Marmon Herrington.

HARTLEY Oh.

CLOUGH You don't see them now but they were like a – well, a small truck, but actually designed to pull guns and limbers.

HARTLEY Yes.

CLOUGH So I used to go out with the troops every day and fired my first gun at fifteen and, at that stage, all I wanted to do was to join the army. My father was always much happier in the army than he had been in private life and all I wanted to do was join the army.

- 20 So when I was sixteen, I applied to go to Duntroon. I was sixteen in 1942. At that stage the war was pretty grim. Actually in '42 I think everybody thought we were probably going to lose because the Japanese were coming down to Australia and were expected to land at any time. My teacher said, what are you going to do when the Japanese sail into Fremantle Harbour. One of the kids said, throw stones at them, Sir! [laughter] There was not much else stopping. So when I was sixteen, I applied to go to Duntroon and they said, you are too young. Come back in a year's time. So I had the opportunity of either going back to Scotch and getting better marks. I'd done [the equivalent of the TEE, the leaving exam as it was then.

HARTLEY Yes.

CLOUGH And I had passed. I did that in a year. At Scotch, years eleven and twelve were in one class because they didn't have enough students and so what they did is they taught the two year course in one year but they expected you to do it twice! And so at the end of my first year there, we'd done the full course so I sat the exam just as practice and I thought I'd come back and do it properly the next year, but I passed and then couldn't get into Duntroon because I was too young, but not because my grades but because of my age.

HARTLEY Yes.

CLOUGH 22 All the time I was growing up, my mother had told me, 'Harold whatever you do when you grow up, never be a contractor'.

HARTLEY Did she?

CLOUGH Get a good steady job in a bank or an insurance company. So I got a job in an insurance company and I worked for a year in the AMP. I was a complete and absolute failure. I remember one of the jobs I had was filling in overdue premium notices. The AMP send notices out each year to all their policy holders with a notice to pay the premium and they found out that lots of people, when they got an AMP envelope threw it in the waste paper basket without even opening it because they didn't want to pay it. So what the insurance company did, they had a team of clerks – and I was one of them – and we had an overdue premium book and an overdue premium notice we had to fill in and some plain envelopes, and we had to write in ink on the plain envelopes.

HARTLEY To make it look like a personal letter.

CLOUGH Make it look like a personal letter and we then had to copy the amount in the ledger onto the overdue premium notice and put it in the envelope and send it out.

24 And I remember I sat at a table with three or four girls who were doing this, the only boy – I was only seventeen, or sixteen, at the time – there. The girls used to talk incessantly all the time, write these things out two or three times faster than I could and – while I was laboriously writing these things out, they were just doing them all in a flash. And I remember getting into trouble because I filled one out – it was £1/6/3, and I wrote £163 and it went out to the policy holder, he came in to see the manager to complain and I got called into the office. I was told, 'Clough, you are the dumbest clerk we have ever had! You can't even copy a number from the book onto the premium notice without getting it wrong'. So my year in the AMP taught me something. It created a very adverse impression.

HARTLEY It taught you what job you didn't want to do.

CLOUGH That's what I didn't want to do. I've never been so bored in a job in all my life. So at the end of that year, which would have been 1943, I had to decide what I was going to do. And, whereas the year previously when it looked as if we were going to lose the war, by the end of 1943 it was obvious we were going to win. It was just how long it was going to take. And also, I guess I was a year older and I started to think that I am not sure I want to be in the army in peacetime forever, but I certainly wanted to get out of the AMP. What I really wanted to do was get out into the open air and work on something outside.

26 Anyhow, I decided that engineering was the thing to do. I applied to get into the engineering school. I got rejected because there was a quota of 40 and I came 44 and so I then agonised on what I was doing. And I think I had applied to do one of the sciences, either chemistry or biology and still wasn't sure what I was going to do when about a week before first term started I got a call from Prof. Blakey, Frank Blakey, to come down and see him and I duly fronted up, and he said, Well, Clough, there have been some dropouts and I can give you a place in engineering. And I said, oh, thanks very much Sir.

That's great. He said, mind you, you are fortieth out of a list of forty and you will never get through! [laughter] You old bastard! And I can tell you when I started I thought I was the keenest student in the university because ...

HARTLEY You would show them, wouldn't you!!

CLOUGH Well, I wanted to show them, but I also I knew that if I missed out, I was likely to finish up as a clerk in the AMP or such a thing and I knew that's what I didn't want to do. So there we were.

HARTLEY So that was 1945, you started, did you – or '44?

CLOUGH I think it was 1944.

HARTLEY That was before the servicemen came in.

CLOUGH 28 Yes, they came in at the end of the following year, I think. Yes, I am pretty sure it was '44. I would have been seventeen.

HARTLEY In those days, it was a free university, so called. You didn't have to pay for tuition.

CLOUGH It was a free university and not only that, the Commonwealth Government gave you assistance. As I said, I reckoned I was the keenest student in the university for the first year. I did fairly well.

HARTLEY You must have done. You got first class honours, didn't you?

CLOUGH Yes.

HARTLEY That's very good!

CLOUGH Yes, that takes longer, and the tradition was in the university, Frank Blakey was a Queenslander and not only Dean of Engineering but also Patron of the University Rugby Club, and the story was that, to pass engineering, you either had to be a good student or a good rugby player. Blakey would never fail a good rugby player because he wanted to keep him on! So I'd always played Australian Rules at school. Not very well, but that was the only game I knew. I didn't even know what rugby was, but I thought well, if he reckons I haven't got a chance, perhaps if I played rugby, I could redeem myself. So I took up rugby and I must admit I enjoyed rugby much more than I enjoyed Australian Rules.

30 And I finished up getting a half-blue for rugby. I think I got a bigger charge out of my half-blue for rugby than getting my degree! I don't think it was very well deserved but anyhow, I got it.

HARTLEY So what did you do in the holidays, the vacations, when you were at university?

CLOUGH Let me think. What did I do? My first year vacation, which would have been at the end of '44, I think I worked for Tomlinsons in their drafting office for whatever it was – six to eight weeks, ten weeks or something.

HARTLEY That was quite a big organisation in those days, wasn't it?

minutes

CLOUGH Probably the biggest engineering organisation in the state in those days. One year I worked for a surveyor from Albany. What was his name? And we were surveying up in the country between Moora and the coast, in all that sand plain country up there. I will think of his name in minute. And he was a tough cookie. He used to carry his theodolite over his shoulder in one hand and his chain in the other and I was his chainman and spikeman. So I used to carry a bag of steel spikes and a hammer and the chain.

HARTLEY 32 A Gunter chain. They called it a Gunter chain, didn't they. The one with the handles?

CLOUGH No, I don't think it was a Gunter chain.

HARTLEY No?

CLOUGH I guess it would have been oh probably a sixty-six foot chain or something like that he used to drag through.

End of Tape 1, Side B,

Tape 2, Side A

minutes

CLOUGH 00 He used to walk all day at a hundred miles an hour. Gosh he was fit. And I thought I was pretty fit at the time. We used to stop for lunch and you'd stop on this sand plain and, you know, there was nothing. No shade. And you would see a 100 metres away over there a bit of a tree or a shrub and think, gee, at least I can get some shade, so you would go over there to have your lunch. What you didn't realise is that's where all the kangaroos used to also sit.

HARTLEY That's where the ticks were.

CLOUGH 01 You'd finish up full of kangaroo ticks! So each night we used to stop and cook our dinner because we used to camp out. So you would strip down and go over each other inch by inch to find the ticks and, if you pull a tick out, you tend to leave its head behind and you get a boil, so you had to have a hot needle, which you would stick up the back end of the tick and then it would back out and then you could grab it. Oh gees! And so we worked up there probably for a month or two and then we went down and worked out of Albany for a month or two. What was his name? Frank, not Campbell. Frank someone. Anyhow.

HARTLEY So was it a five year course then, or four year course.

CLOUGH Four year course. Oh, actually, it was a three year course to start with, because it was a war time course.

HARTLEY Oh that was a BSc, was it?

CLOUGH 02 Yes, it was a BSc Engineering. So I did that, and then I carried straight on and did the BE and when you got your BE, they cancelled your BSc Engineering. So the first three years, I did civil engineering, but in my final year we had somewhat of a charismatic, mech. lecturer called Bob Walker. When I did his mechanical engineering lectures in my third year, he really got

me enthusiastic about the business opportunities in mechanical engineering, so in my last year I swapped to mechanical engineering and wrote a thesis on – what did I write my thesis on? It was something like, how to set up a business.

HARTLEY Oh. Very appropriate!

CLOUGH Yes.

HARTLEY He sounds a rather unusual type of lecturer to have enthused people about the the business side of engineering. That's pretty rare.

CLOUGH 04 Yes, he was. His benefit was that he'd had a lot of experience in industry during the war and, yes, he was a great guy, actually.

HARTLEY What did you want to do when you left then?

CLOUGH When I left, I didn't really know – actually, come to think of it, my mother in particular knew the chairman of Co-op Bulk Handling, a bloke called Wally. They apparently met up and she'd mentioned to him that I was just about to graduate. He said, oh you should send him in to see me. So I went in to see this fellow, whom I had met before. He had a big farm down in the south somewhere, down Esperance way, in that big Esperance development. Actually some are still down there.

HARTLEY Oh.

CLOUGH 06 I will think of it soon. And he said, why don't you come and work for Co-operative Bulk Handling? And mainly because I didn't have anything else on, I did that, and worked with a – they had a chief engineer, Alan Stephenson, and I worked as his 2 i/c and was sent all over the state looking at bins and testing weigh bridges and everything that Co-op Bulk Handling did.

HARTLEY They were bringing bulk handling in then. The bulk handling was coming in on a large scale then, was it?

CLOUGH Well, it had been set up before the war but Co-op Bulk Handling was probably one of the most progressive bulk handlers anywhere and they had this American fellow came over before the war and convinced them that they should go from bags to bulk. But he had problems because the railway trucks weren't designed for bulk and the sidings weren't designed for bulk, but he was innovative. They'd lined all the railway carriages and put sideboards on them so they could fully load them. They built bulk bins at all the sidings, developed what they called Clark shovels and elevators to take it from the bins into the railway trucks – all very innovative at the time. Then at the ports, particularly at Fremantle, the Commonwealth Government built very sophisticated bulk loading silos and bulk loaders and ...

HARTLEY Oh that was the Commonwealth government, was it that built those?

CLOUGH 08 Yes, because Co-op Bulk Handling ran it and maintained it and so I crawled all over it, but I just remember it. Anyhow, it was designed by the Commonwealth Government engineering department – which you must remember in those days the state and federal governments had very strong day labour forces. They used to design and construct everything, and didn't use consultants, didn't use contractors. They did it all, whether it was bridges, roads, power stations. Until 1957, there wasn't an engineering contractor in

Australia. Everything was done by government. So if you were a civil engineer, you worked for the government. The only engineers that didn't were those that designed city buildings and so on. But as soon as you got out and wanted to do what we considered as engineering infrastructure, it was all done just automatically by either state or Commonwealth Public works. I remember Public Works were major employers and employed hundreds of engineers.

HARTLEY How long were you with CBH then? Enough to crawl around all the sidings in the country.

CLOUGH 10 Oh yes. I would say two or three years, something like that. About 1950, I left CBH and, together with a couple of mates, decided to drive to Melbourne and we drove across the Nullabor.

HARTLEY That was an adventure in those days.

CLOUGH It was an adventure in those days. I don't think the bitumen even got to Northam. Once you got out of the hills, it was gravel all the way and once you got onto the Nullabor, it was something like 600 miles between petrol stations. You had to carry your own fuel to get across. But I remember, we drove up to Coolgardie and we got a job working there for two or three months, worked at the North Kalbarli Gold Mine as an underground fitter.

HARTLEY Oh.

CLOUGH 12 But in the early 50s, you could get a job anywhere. There were a lot more jobs than there were people to take them, and so we took advantage of that and just walked into the Gold Mining Office and said, have you got a job? They gave you a job.

HARTLEY So what did you do?

CLOUGH As I said, we stopped at Coolgardie for two or three months and I worked in Coolgardie, I worked for someone else. I've forgotten who it is now, but I remember I went up north of Coolgardie and worked in a mine up there. They sent me up there for a while and then I came back and worked in the office at Coolgardie and then I went into Kalbarlie. That's when I worked at the North Kalbarli Gold Mine as an underground fitter. We stayed there for three or four months. Then we drove across the plain and I went with a fellow called Peter Wright – he was another engineer, a bit younger than me. I remember we got about halfway across and he was driving and I was half sleeping in the seat next to him and we went down this hill and it curved around. We went down the hill and instead of curving round he went straight off into the desert. You went to sleep, your stupid ---! He said no, the steering didn't respond. I said, oh! So we backed it out and I had a look at it and the front wheels were like this, and we'd dropped the idle arm on the steering.

HARTLEY Oh.

CLOUGH 14 So we got a length of fencing wire and we sort of wired it all up and drove into the next town, which was a couple of hundred kilometres further on and took it into a service station there and he put a bolt through it to hold it more steadily and then decided to weld it to make sure that it didn't come off. I said, look, don't weld it because you will do more harm than good. But he went and welded it. We'd only got another hundred yards and it broke where he'd welded it so we wired it up again and drove into Melbourne with that.

The only trouble was, I think, that we could turn right, but we couldn't turn left! We had to go around blocks. Anyhow, we stopped in Melbourne and got a job with a fellow that made lead batteries. I made lead batteries for about three or four months while we got the parts for the car, a Nash sedan. Wesfarmers were the agents.

HARTLEY Yes.

CLOUGH I can now remember the town where my mother grew up. It was Landsborough.

HARTLEY Oh, Landsborough.

CLOUGH Just north of Ballarat, in the centre. They had a sheep farm there, but they couldn't support the twelve kids so, as the kids grew up, they had to take off.

HARTLEY Needed all the kids for twelve kids.

CLOUGH Yes. They all came to Western Australia in the early 1900s because Western Australia still had a gold boom going on.

HARTLEY Yes. So what did you do when you got to Melbourne?

CLOUGH 16 I caught up with my old lecturer from UWA, Bob Walker, who was working in Melbourne with a company called W. D. Scott and Co., management consultants.

HARTLEY Oh yes.

CLOUGH And he said, 'why don't you come and work for us?' So I did that and the first thing they did was to put me through a school in Sydney doing method/ time measurement of workers. It was a method of determining the time it took to do any operation which they normally did with a stop watch.

HARTLEY Yes.

CLOUGH But you didn't need a stop watch. You watched to see what they were doing and then you could write it all down in this method/time measurement and they had standard times for doing everything. They had a standard time for reaching down and putting down a cup. They had a standard time for reaching and grabbing the handle and taking a drink, and a standard time for putting it back again. The workers were always complaining if you put a stop watch on them, but if you just stood there and watched them for a while you could get the same result without a stop watch.

18 So I became quite a wizard at method time measurement and they then sent me up to Maitland. It is just out of Newcastle, northern New South Wales. I will think of that in a minute.

HARTLEY Bairnsdale? Bairnsdale is the only one I can think of.

CLOUGH No. And I was working for a cotton manufacturer, Bradford Cotton Mills, spinning and weaving cotton. In those days, Australia used to do everything itself.

End of Tape 2, Side A***Tape 2, Side B is blank******Tape 3, Side A***

minutes

- HARTLEY 00 This is Richard Hartley speaking on the 20th March 2009. I am continuing my talk with Harold Clough about his early days in the construction business. Okay Harold?
- CLOUGH Thank you Richard. Previously we got to the stage where I'd taken the job with W.D. Scott and Company who were management consultants based in Sydney and had been through a course in method/time measurement which is a type of – in those days, was a refined time and motion study system, where instead of using a stop watch which all the workers hated, you just had to look at them and you could record down what they were doing and decide how it could be done more efficiently.
- HARTLEY Do you think that sort of thing applied to civil engineering works as well? The time and motion study, because they vary a lot more, don't they?
- CLOUGH No, the time and motion study mainly comes into being where you have people doing repetitive tasks. The difficulty with construction is that every task is different; every site is different, every building is different, and you get some repetition – well, you could say that a bricklayer is just laying bricks, type of thing, and you can do work on that – but in the main, most of the waste of time in construction is from the management point of view. It would have a pretty poor efficiency rating if you looked at it.
- 02 So, after I had been through my course in Sydney, I went up to Bradford Cotton Mills at Maitland, in northern New South Wales, in the Hunter Valley, and worked there for probably half a year. I was there when I was advised that I had won a Fulbright Scholarship to go to the University of California to do a masters degree there in industrial engineering. So I quit my job with W. D. Scott and, actually, I flew home and then flew from Australia to America in a Super Constellation, which was the latest aircraft at the time.
- HARTLEY How many legs was that?
- CLOUGH From memory, we went to Fiji, and then we went to Canton Island, and then we went to Honolulu and then we went to Los Angeles, so five legs. And it took something like two days. But it was a great airplane. It had a lounge downstairs where you could get up and go downstairs and have a drink, and so on. In those days, flying was very expensive, and very much a luxury type of travel, because everybody travelled by ship.
- 04 So I flew to California. I landed in Los Angeles. I spent a week or so there because my mother's older brother had migrated to California. He was a carpenter and when the San Francisco earthquake demolished half of San Francisco, he took off from Australia and went to San Francisco and finished up in Los Angeles and had a factory making furniture for banks that had those massive timber counters and things that they traditionally had.

HARTLEY The lovely old counters they used to have in all banks.

CLOUGH Yes. And he did very well and was very prosperous when I met him. He was married to an American. They had no children, so I was given a right royal welcome and shown around for a week and for me it was mind boggling. It was 1951. America was probably at the height of its power ever. Its living standards was at least several times higher than ours and everywhere I went the wealth and the affluence was just really apparent and dominant. And [this was at a] time when things in Australia were still rationed. You couldn't buy motor cars for instance. You couldn't buy lots of building materials. I think petrol, when I left, was still rationed. In America everything was open and they were selling.

06 So after a week in Los Angeles, I took the train up to Berkeley, just out of San Francisco where the university was, and it was an all day – something like a six hour trip – and I did tell you the story previously about how I was very conscious that I was arriving at Berkeley late in the afternoon and I was hoping I could get there before it got dark because I had to find my way up from the station, which was a kilometre or two from where the university was and I was never too sure how I was going to do that. I had all my worldly goods in a suitcase and I was heavily laden. I remember asking the Negro porter on the train whether the train running late, and he said, yes, we don't have many passengers today, and feeling as if, geese, you know. And then I realized that he had taken it as, is the train running light, because of my accent. And so I thought about that for a while, and the next time he came around, I said are we running on time, and he told me we were. So I got into Berkeley on time and got to where I was staying at the University House.

08 That was a tremendous experience, because there were 500 students, half American and half foreigners, half men and half women. When I was there, I think we had 54 different nationalities, and coming from Australia – particularly Perth – where in those days, you never saw a foreigner, because we were not on the way to anything, suddenly all these interesting foreign students, and half of them were exciting exotic foreign women. And not only that, because to get into the university, you had to speak English, they all spoke English, so you could even communicate with them.

I met on the plane going over another West Australian called Ron Lyons, who finished up as a professor of geology at Stanford, but we used to go down to have our meals together and we used to eat it buffet style where you had a tray and you picked up what you wanted and then you went to sit at a table. And Ron and I would pick up our meal and say, well, who will we go and stir up today? Particularly, when we first arrived, the national groups used to sit together, and when we sat down, they would all be talking either French or Italian or Chinese or something. Immediately, we sat down, they'd all switch to English and we had tremendous debates on how we were going to save the world. We also got the reputation of holding the best parties on campus and for the first few months, I really had a ball. I used to go to the lectures, but apart from that, I did no work. I just partied.

HARTLEY What time of the year did universities start?

CLOUGH I remember I got there in September and ...

HARTLEY So it would have been October, maybe, you started, would you?

- CLOUGH 10 Yes. No, I might have got there in August and started in September, but it was the latter half of the year and in Europe and America, they have their main holiday seasons in mid-summer, which for them is June, July, August, sort of thing. And then California had a system of two semesters a year, each of about five months, I suppose – four and a half months. But you had final exams at the end of each semester and, after I had been there a couple of months – or it might have been a bit longer. Anyhow, a month or so before the end of the first semester, I was advised that if I didn't get a 3.5 grade average, I didn't lose my scholarship, but the University of California who had waived my fees only continued to waive fees if I maintained a standard in my exams. And if I missed out on that I was up, I think, for \$US3000 a semester – which was money I didn't have.

So suddenly passing my exams became all important and, for the last month, I gave up partying and studied. What made me particularly nervous was that I had no idea as to how the American standard of examinations and so on would compare to what I was used to in Australia. As it was, although I only really studied for the last month of the first semester, I got much better results in America than I had ever had in Australia, which I put down as an indictment of the American education system. Because looking at our lecturers and professors at UWA, there were some good ones, but there were some horrible, terribly poor ones too.

- 12 But one way or another, I am convinced we had a much better grounding in the fundamentals of engineering than they did. And the Americans were much more conversant with all the latest things that were happening and the developments. They were much more articulate usually than we were, but when it came to an argument, if you could get them back to the fundamentals of the subject, you could win every time, because their fundamentals were always a bit shaky. And so once I had learnt that, I felt much more comfortable.

So, at the same time as when I arrived, I had been advised by my mother's brother who lived next to us – a bloke called Bill Hayes, who was a chartered accountant in Perth – that he had a friend working in San Francisco, who worked in the Australian Embassy as a press attaché and I should go and look him up. So after we had been there a week or two, Ron and I went into San Francisco, which is just a train ride across the bay, and went to the Australian Embassy and made ourselves known anyhow. We also looked up Norm McRae, and he invited us both home for dinner. He lived in Berkeley, only walking distance from International House, so we went to dinner. He had two daughters, so I took out the older one and Ron took out the younger one and we had a great time in San Francisco, except I think I came on a bit strong towards the end of my first year and so she took off to New York and I went down to Los Angeles.

- 14 Oh, this was after I had finished my degree in California. I had stayed on for a couple of years working for Bechtel Corporation and a year in their estimating department in San Francisco, which was the best training I had ever had, even though at the time I wanted to get out on a site and do things, instead of sitting in an office and estimating. Bechtel had some great systems and I learnt a lot about estimating and, if you are in the construction industry, you live or die by your estimating ability, more than anything else. You've got to know your costs. And after I had been in estimating about a year, they sent me down to Wilmington, just out of Los Angeles where they were building an oil refinery for Shell, and I worked there for a year as a cost engineer,

keeping the costs on site. It was fascinating and interesting and I thoroughly enjoyed it.

HARTLEY How many people were in the Bechtel organization?

CLOUGH At that time?

HARTLEY Yes.

CLOUGH Oh, look, I wouldn't know but at that time, it wasn't one of the biggest engineering companies in America, but it was probably the fastest growing one. But probably something like 5,000 or maybe 10,000. I would say they've got three or four or ten times that now.

HARTLEY The San Francisco is the head office.

CLOUGH 16 Yes. But they were already working all over the world, because we made estimates for building refineries in Aden and other places in the Middle East, which became very valuable experience to me later on as I will explain when we get to that.

HARTLEY You were saying that they actually made the estimates in American dollars.

CLOUGH When they were looking at work overseas where, if they didn't already have an office there, we would make an estimate as if it was in the Mexican Gulfs area where most of the refineries were built and then just apply a factor to equate it to a foreign country.

HARTLEY Who decided the factor? That must have been fairly difficult.

CLOUGH Oh, yes. It was just a guess. Well, we'd estimated all materials, we'd estimated all the plants and that was pretty standard. What we didn't know were the labour costs and the particular costs for the country and we just put a factor in on those and, yes, we won work. And we made money, so we generally got it right.

18 I decided to go to work for Bechtel because I'd always wanted to get into business for myself and a difficult part of getting into business is how you start up, how you pay the rent in the first six months, when you don't have any income, and I'd never had a desire to go into the construction business because my mother had always told me as I was growing up during the Depression, whatever you do when you grow up, don't be a contractor. Get a good steady job in a bank or an insurance company! Because in depressions there is no work for contractors and the only people who do well is with a good steady job and banks and insurance companies were looked upon as the places to be.

I decided I would not follow my mother's advice and would come home and start working with my father who wanted me to come and join him and who had a building business in Perth. And so I went to work for Bechtel to find out how American builders worked.

HARTLEY Was it difficult to get a job with them?

CLOUGH No. It wasn't. I just looked for the advertisements in the paper. They were advertising for people and I went down there and they gave me a job. A great company, and we subsequently did quite a lot of joint ventures with them in

Australia so I got to know them well as all sorts of people. It might be because they were a hundred times bigger than we were but you talked ... Riley Bechtel runs the company now. I haven't seen him for two or three years.

HARTLEY So meanwhile you were making all these expensive phone calls to New York then.

CLOUGH 20 Oh yes, I remember telling you that story too, how I'd come on with Marg a bit strong and so when I was working with them in San Francisco and she was working there too, so she took off and went to New York and then I got sent down to Los Angeles or Wilmington, and I used to ring her up once a week. In those days there was no direct dialing, you had to ring the exchange and book a time for the call and then sit by your telephone at the time they said it would be, you know, tomorrow afternoon at three o'clock, and you sat by your phone there and finally you'd get a ring, and then they would put you through and at the end of three minutes, it would go beep, beep, beep and that was the clue that you had to hang up or you had to pay for another three minutes. And I think I mentioned to you that a three minute phone call across the States in those days cost me half a day's pay, so it was expensive! I think I told you the story, we'd speak till three minutes are up and I would say Oh, there's the beeps, Darling. I have got to go now. And she would say, don't you love me anymore? And so I would talk for another three minutes and blow another half a day's pay.

22 Anyhow, after I had finished with Bechtel and came and joined my father, when I came home, he only had one employee so I finished up doubling his workforce and made two. We were working out at the Tip Top paint factory in Newcastle Street – the factory is still there, actually – but in those days there was no ready-mix concrete, and so every building site had a concrete mixer on it and you put sand and aggregate and cement and you mixed your concrete on site.

HARTLEY And you came home covered with cement dust.

CLOUGH Yes! Exactly! And I spent my first year shoveling aggregate into a concrete mixer and all those things, effectively working as a labourer on the site. That was good experience. The problem was that at the end of the year Bill Hayes, the uncle that lived next door, who was a chartered accountant, was keeping our accounts and I got the accounts and we'd gone all year and hadn't made a cracker!

HARTLEY You weren't shoveling hard enough!

CLOUGH Wasn't shoveling fast enough! And I went in to see him and I said, hey Bill look, we've done all this work and we haven't made anything. Are you sure the accounts are right? He said, look your father is meticulous. He sends me in each month all his costs and everything and it is always spot on, you know. He said, it is no doubt, absolutely pucker. So then I started to take an interest in the accounts and what I found was my father was cheating. What he was doing – in that type of building work, you have a lot of sub-contractors, like painters and plasterers and plumbers and so on, and my father knew all the ones that weren't paying tax, because they always wanted to be paid in cash. And they would never give him an invoice, they would just say they needed £500 for the work they had done, so he would write out an invoice for them for £1000 and get it from Bill, put 500 in the pocket and give the other bloke

500, knowing that within a couple of months the fellow would have no idea how much he'd given him, so there was no way anyone could ever check up to see what was happening.

24 And the only reason I found out what was happening was because I was working on the site all the time and I knew what was happening. So I challenged my father about that and he wasn't in the least bit remorseful. He said, well it is my company. I can do as I like, if you don't like it you can lump it. And by this time, I was married to Marg, my girlfriend from America, and we had a young baby, and I said to him, Look, it is alright for you but I've got family responsibilities and so on and so forth. So we had a bit of a stalemate and I had spoken to Marg, and I said, Look, I think we ought to go back to the States if we can because I can get paid three times more there than I am getting paid here and I can't get on with my father because he is cheating. And he used to pinch the money but then spend it all on the SP bookmakers and so blow it all. But then something happened that changed all that and I think I told you this story too, because I remember it. See if I can get it right again. National Mutual Life Association, which was one of the major life insurance companies in the country at the time. They have since been taken over. They decided to build a new office in Perth, which was a 12 storey, multi-storey building.

26 Twelve storeys at that time was the highest office building in the city, and really the first high rise building to be built after the war. This would have been about 1956. I came back at the beginning of '54, yes, so it was sometime about '56. So National Mutual had Hobbs Winning and Leighton as the architects for their new building and my father was particularly friendly with Athol Hobbs who ran it and Athol Hobbs was the son of Major General Sir John Talbot Hobbs and very influential.

Before the Second World War, my father had joined the militia army. He'd been in the First World War and was in the ANZAC landing and had spent the full time at Gallipoli until they evacuated from there. And then he went to France and spent the rest of the war in France, got injured and gassed a couple of times, and one time he was sent back to the UK for treatment. He then did an officer's training school there and got a commission, so he came out of the army, when the war finished in November 1918, they were repatriated first to England and then a couple of months later, to Australia, and he got back about February 1919.

HARTLEY He knew what real war was like.

CLOUGH 28 Well, yes.

HARTLEY Unlike us all.

CLOUGH Exactly. And so when he was in the militia from about, oh, the early thirties until '39, when the second war broke out, he was working with Athol Hobbs who was a commanding officer of the Third Field Regiment, the artillery was where he was. But whilst they were chalk and cheese in personalities, they needed each other and so they were good mates. And when the war started, Athol Hobbs took the field regiment over to Egypt and then to Greece – and they got badly done over in Greece – and my father took command of the Second Third Field Regiment here as the training regiment, and I know as growing up I spent my school holidays with my father in an army camp.

HARTLEY You told us about that last time.

minutes

- CLOUGH Oh, I told you, you've got that.
- HARTLEY Yes.
- CLOUGH Anyhow, I am roaming a bit, but ...
- HARTLEY Your father had good relations with Athol Hobbs.
- CLOUGH Yes, anyhow, he decided we ought to try and bid for this new National Mutual Life Association building which was about £500,000 in value at that time.
- HARTLEY That was a big step up for him, wasn't it?
- CLOUGH 30 Yes, well, I think I mentioned to you before, the biggest thing we had built before was a twenty or thirty thousand pound factory and going to a five hundred thousand pound office building was a hell of a big step and, I think when my father approached Athol Hobbs to get on the bid list, he would have been concerned but, well, there are ten bidders so there is no chance that he will win it, so I might as well give him a go. And so, we got onto the bid list.
- HARTLEY Were these all West Australian firms, or some from the eastern states?
- CLOUGH I think they were all West Australian.
- HARTLEY Were they? That's quite a lot, isn't it?
- CLOUGH 31 Oh yes. There was a lot. What was the one that was our biggest competitor? Sandwell. A name like that. But there was a whole stream of well known builders and they were all much bigger than we were. But we got on the list and my father and I were making the estimate and the bids closed at midday on the Monday. So we were working all the weekend on completing it and we essentially did that on Sunday night. We had some of my mother's brothers to dinner and there were half a dozen of us around the table, and we were talking about this bid that we were making and father said, gee, I would really like to win this one. I said, yes, well, let's see how we go. And he said, I think we should take ten thousand off our price, and I said, geese, Dad, twenty thousand's all our profit and ten thousand in five hundred thousand's a big slug. Let's sleep on it and we can decide tomorrow morning. The next morning, I had the job of filling in the Bill of Quantities which took me all morning.

End of Tape 3, Side A

Tape 3, Side B

minutes

- CLOUGH 00 The only office we had was a room on the back verandah, type of thing, and I was out there filling in this Bill of Quantities and, about half past nine, my father came out and said, well, I'm off to town. Make sure you get the bid in on time. And I said, well, what price are we going to put in? You said last night to take ten thousand off it. I think that's a hell of a lot. He said, add ten thousand on, and I said, oh come off it. I said, you can't go ten thousand off last night and ten thousand on this morning. He said, well, make up your own mind, and off he went!

01 And so I filled it all in until I got to the last line where I had to decide what the final price was going to be and then I think I said I did the smartest thing I've ever done. I went and asked my wife. I said, look, he said last night to take ten thousand off and he says this morning to add ten thousand on. What am I going to do? She said, add five thousand, and so that's what I did. I worked on the thing until after eleven and then took it into town. I didn't go into Hobbs' office because there's always a dozen or so crusty old builders there all ribbing each other and, if you're the youngest in the room, you're target for all and I've been there. I don't know whether you've been to a bid opening, but there's a lot of tension because £500,000 was a big contract and so I decided I wouldn't go in early.

02 I walked up and down the Terrace until a minute to twelve and I went into the office a minute before the close, put the bid in the tender box and a minute later, Hobbs came out and opened them up. And I just didn't have a chance to talk to my father to tell him what I had done. Sandwell was the other builder. And the first bid to be opened, or the second bid to be opened was Sandwell, who everybody thought was the favourite because he had had the job of demolishing the old Daily News building which was where they were to build the new National Mutual.

HARTLEY Oh.

CLOUGH The bids were read out publicly and, when his bid was read out, he was £5,000 higher than we were, but £5,000 lower than we would have been if I'd added the ten thousand on which my father left me with. So I knew we were still in the running. He thought we'd lost it. And of the ten bidders, I think we were called out about ninth, so right up until the end, he thought he'd lost it. All the other bids were higher and so, when they were all read out, we had the lowest price – five thousand below Sandwell. The only night we have ever known him to get drunk was that day! We were really only halfway there because, even though we had the lowest bid, they were close and we had to satisfy the client, National Mutual, that we had the capacity to do the work.

04 And once again, I think my father used up all his Brownie points with Athol Hobbs, to get him to support us in doing it. But we were awarded the contract, and it took us to a completely different level. In our discussions with National Mutual, they wanted to know who was going to run the site and I was the only one he had, so I got that guernsey, and we got it on condition that I dedicated myself to the site so that put the kybosh on going back to America. But I still had my problem in the fact that my father was pinching money, but I now had a bit of leverage because he couldn't do the work without me. So we came to an agreement that we carried on but I held the cheque book. After that, we got on much better.

HARTLEY Where did he get his SP money from?

CLOUGH Well, I am sure he still took a bit but he couldn't take much because if he wanted the cash to pay a sub-contractor, he had to ask me and I knew near enough what that was worth. I am sure he got a few hundred here and a few hundred there, but he didn't get anything like he got before. But in any case, he did without that and so the National Mutual fully occupied us then for the next two years.

HARTLEY 06 Did you have to take on all the trades foremen?

CLOUGH All that.

HARTLEY All that.

CLOUGH We probably had, oh, fifty or a hundred people working there at its peak, but at that time there were a lot of tradesmen available and we got some very good people. We got a lot of people that stayed with us for the rest of their lives, because we sort of kept on growing. But that was a mega-jump and what happened after that, we were half or two-thirds through that building when the Main Roads Department decided that they wanted to build a bridge across the Narrows.

At that stage, all the civil engineering works in the country were done by either State Public Works Department or Commonwealth Public Works Department, so every bridge, every power station, every road, every port was all both designed and built by either State or Federal Public Works Departments, employing day labour. So, apart from the work done about the same time on the Snowy River where they got American contractors in to do that, there wasn't any civil engineering contractors in the country, because there was nothing for them to do.

HARTLEY And it was all based on annual budgets and how much they had to spend before the next election.

CLOUGH 08 That's right. The Main Roads only a few years previously finished the Causeway, which I think they started during the war, but once again, it took five or ten years, because they would build a span every year when they got another budget to do it with. When the government said that they wanted them to look at a bridge across the Narrows, Main Roads suggested they build another Causeway, but the government in their wisdom, decided that whilst the Causeway was all right where it was, this was a pristine site where they thought they would like something a bit more interesting, and they made a breakthrough decision to engage the top English engineering consultant to design the bridge, and they picked Maunsell and Partners out of London. They designed the Narrows Bridge, which was really state of the art at the time it was built.

HARTLEY It still looks pretty good.

CLOUGH It still looks pretty good, doesn't it? Undoubtedly, a very wise decision. So Maunsells designed the bridge but then when they came to discuss how they'd build it, Main Roads said that they could build it with day labour.

10 Maunsell persuaded the government that they would be better off to get a bridge building company who knew how to build prestressed concrete bridges, to build it.

HARTLEY Was prestressed concrete pretty rare in Australia at that time?

CLOUGH Yes, and prestressing was right in its infancy and I think when the Narrows was built, its central span was the longest pre-stressed concrete span anywhere. Mind you, it was very quickly overtaken by much bigger spans, but in 1957, that was the situation. So the Main Roads called tenders for the Narrows Bridge, but one of the conditions of tendering was that you had to have built a bridge of similar magnitude before, and that really cut out any possibility of an Australian bidding for it. Mainly because I'd worked for Bechtel on work they did in foreign countries, I knew how difficult it was for a foreign company to actively estimate work in another country. So I got a structural engineering handbook from the UK, and it had in it advertisements

from all the leading world bridge builders, so I picked out half a dozen at random and wrote to them suggesting they bid for the Narrows and that they joint-ventured with us. We could provide the local knowledge and they could provide the skilled bridgework.

- 12 I must admit, I was surprised at the time, I got responses from all six. Four of them declined. Two of them said they were interested in doing it so then I had to decide which one I went with. One of them was Christiani and Neilsen out of Copenhagen in Denmark and they had a great record of bridge building and concrete works generally. So we agreed to work with them.

HARTLEY What was the other one?

CLOUGH Oh, I've forgotten. An English company. But I think I made a wise choice. It was a much smaller company and they had much less experience. I think they went out of business shortly after. I've never heard of them again. No, I couldn't remember, even if I tried.

HARTLEY How did they do the bidding, Christiani and Neilsen? Did they come out here and bid with you?

CLOUGH What they did was they had a subsidiary operating in South Africa and the fellow running that was a fellow called K. H. Sørensen, and they got him to come over and meet us and have a look. So that was fine, and I think what persuaded them that they could join us was because I could take them down to the National Mutual building and here was a concrete building three-quarters finished and we obviously had people, and so on. Although I remember, I still didn't have an office, except the office I had on the site, but I remember I borrowed an office from Bill Hayes and we worked on the estimate there. But K. H. Sørensen and I sat down and effectively made the estimate here. We drew up a joint venture agreement. They had an eighty per cent interest and I had a twenty per cent interest. I think that's right, but they were certainly the leading partner.

HARTLEY What sort of input did your father have?

CLOUGH 15 Well, he was certainly involved and I think to some extent that gave a bit of maturity to what we needed because at that stage – it was '56, '57 – I was 30, 31 perhaps, whereas my father was in his late 60s. I think if I had been on my own, they probably wouldn't have gone with us, but with my father and myself, we had maturity there and here was a keen, young engineer. Anyhow, we bid this together. I must admit I was very impressed with Sorensen because Maunsells, as well as designing the bridge, had also designed and recommended how it should be built and given a construction programme. The Narrows really consists of five beams resting on four piers and it was made of pre-cast concrete segments, each about ten tons and about ten feet long, as I remember. They had to be assembled and then stressed together.

HARTLEY Post-tension then?

CLOUGH Post-tension, yes.

HARTLEY Any pre-tension involved?

CLOUGH No, it was all post-tension. They used a Gifford Udall strand prestressing system which has now been overtaken but, at that time was state of the art in

pre-stressing. Maunsells had said that we should build a casting bed on the foreshore opposite the bridge and pre-cast the elements and set them up in effectively a formwork there to their full size and length, and then post-tension them on the shore, but then lift them up with what would have had to have been about a 500 ton crane and float them over and place them on the piers.

HARTLEY Wow.

CLOUGH 18 There wasn't a 500 ton crane in the whole of Australia and we debated at length what we should do about this and how much a floating crane would cost, and so on, where we could get one from, and then, I remember, we had been discussing that one afternoon and evening and I came back next morning and Sorensen overnight had come out with a completely different construction method. He had found out that in Western Australia, particularly at that time, you could buy jarrah timber piles or poles very cheaply and they were strong and he said, we will pile across the river. We will put trestles on the piles, we will erect the units in their final position and then we will post-tension them – a complete change to the whole concept. That meant we no longer had a 500 ton lift, but we still had to have a 20 ton lift to lift the units into position. And for that he sketched a gantry crane that spanned the whole of the bridge and ran along each side, once again on timber piles, and another gantry in the construction yard that could pick up the units and put them on a railway track and run them out on a railway track. There you go, there's all the timber piles.

HARTLEY Oh yes.

CLOUGH 20 And they were cast on the South Perth side and there was a foot bridge running all the way across. It has been demolished here in the centre. And a railway ramp from the casting yard right through to here and then, over the whole of the bridge, there's a big gantry crane with a 20 ton lift that could lift the units up and take them across and put them in their final position. He proposed this. I certainly wasn't in any position to argue with him, because I didn't know how to build a bridge in those days either. We completed our tender and we put it in and we had it awarded. It was a very successful contract. Once it was awarded, we started up and built the construction yards on South Perth and the offices and so on. A month or two after awards, they sent out the project manager who also came from South Africa – a Dane, from South Africa – that had worked with Sorensen there. A fellow called Leif Ott Nielsen, who became the project manager and I was the deputy project manager. But probably there were four or five Danes came out, mostly from Copenhagen, and we took on two or three Australian engineers that worked with them. We had a mixed Australian-Danish team. I had to get a new manager to finish the National Mutual and I got one of my old university lecturers to do that.

HARTLEY Oh really!

CLOUGH 22 So we had the National Mutual being finished off and, fortunately, it only had six months to run and by that time all the things that could have been difficult had been done. It was just the finishing works which are time-consuming and expensive, but not ... it's harder to make mistakes than when you are putting up the thing to start with. So I spent all my time on the Narrows. Yes, we had some exciting times.

- HARTLEY You were saying something about the temporary piles were how you discovered about the movement of the soil. That was interesting.
- CLOUGH Oh yes. All the northern side of the bridge was on reclaimed land. They were all mud flats when we started and the mud here and the piles here were all about 60 feet long and there was 60 feet of mud under here and the Main Roads just brought in sand and dumped it on the mud and we drove the piles across the river. And you can see here that the piles are in lines and I think they were 10 feet apart and we had pile caps which were 12 inch by six inch karri half caps that went across the full length of the bridge. On those we had trestles standing up, that came up underneath the bridge. And Leif Ott Nielsen and the project manager and I were walking across here one day, and we got to about here and looking down the line of piles and half-cap, there was a great big bow in this 12 X 6 karri beam. And I said, gee, how in the hell did they get that so wrong? I was saying, how could they bend that half-cap beam around like that instead of moving the pile to where it ought to be? And then it dawned on us that the piles had all been pushed over and when we investigated, what we found was that the mud was not only going down but also being extruded out.
- HARTLEY Oh.
- CLOUGH 25 And under this shore pier here, there were what they call Gambia piles going down. Gambia piles were about 30 inches – might be 36 in diameter – and probably three-eighths plate, and at the toe of them they had a reinforced concrete toe cast, which was a few feet long. But then to drive them, we dropped a hammer down the pile and hit them at the bottom instead of at the top, and in the concrete we cast in the toe, there was an anvil that the hammer hit, and we had a ten ton hammer, which was about 10 feet long, and a bit less than 36 inches in diameter. But this thing dropped down and actually pulled the piles down. As we drove them down we added tubes to the top and when we got to resistance ... that big frame you see standing up was our pile-driver.
- HARTLEY Oh, was it?
- CLOUGH 27 The boiler behind it drove the winch and we lifted piles up and placed them there and those hinged. The guides came down and the pile was locked in position and then the hammer was picked up and dropped down the pile. When we had driven it – they came in about 20 or 30 foot long pieces – when we had driven them down that far, we'd put another length on top, weld it up and drive again. And the piles were going down about 80 feet or something of that nature. On top of the piles, we had a pile-cap, and then on top of the pile cap, we had the piers and on top of the piers were the beams. But we became very conscious if we drove 20 or 30 piles, whatever it was, under that pile cap there, that the mud over 60 feet was pushing out and it didn't matter what you did, it was going to push the piles over.
- HARTLEY Yes. Scary stuff.
- CLOUGH Scary stuff. So we sat down with the consultants and agonised what we would do here and what was finally decided was that we would put a caisson on around the piles off-set towards the shore where the mud was coming from, because they believed that the movement of it would be limited to a couple of feet or something of that order. And so if each of the piles had this caisson around it, the caisson could move a couple of feet before it hit the pile. And

minutes

that's what we did. But I must admit I still have reservations about that because you had to make an assumption as to how far this mud was going to be extruded, and if you allowed a couple of feet, and it happened to be three feet instead of two, it meant that pier would be pushed over.

HARTLEY Oh.

CLOUGH 30 And that had some interesting implications, because the pier itself is a hinge and it's to allow for the longitudinal expansion and contraction of the bridge and so it rocks on the pile cap and it rocks underneath the bridge and so the bridge can move quite a long way longitudinally and the piers just rock over and back.

HARTLEY So it is pinned at both ends.

CLOUGH It is essentially pinned at both ends, yes. When you say "pinned", they are just round rollers. It is really like a big roll. So movement in that direction wouldn't worry it, but across the bridge, three of the piers had little rollers in their base so the bridge could also expand across its width, except the second pier from this end, there, and that one was fixed. One of them had to be fixed to hold the bridge in position and one on one side and two on the other could roll that way. What I decided was, the bridge went across this way, the mud was coming out that way at about 45 degrees, I believed.

HARTLEY Yes.

CLOUGH So I believed if it moved and if those caissons moved against the piles, it would be alright in the longitudinal direction, but in the transverse direction, it would start pushing the pile cap this way and the base of the fixed column, being held at the top by the bridge, couldn't move. As you can see, the columns are Y-shaped and I decided if the pier moved effectively down stream, which was the way the mud was moving, the base of the pier would move, and where it would fail is in compression.

End of Tape 3, Side B

Tape 4, Side A

minutes

CLOUGH 00 So, if a pier moves into the river and downstream, when it moves on the downstream component, it will put bending moment into the column and the column will fail in the corner of the "Y" shaped column, and I had a little bottle with a message in it that said, when this failed, I told you so, and I was wanting to cast it in there when we cast the pier, but someone told L.O. Nilsen about it and he was horrified, so I was never able to do it. But every time I drive underneath here on the shore end, I have a look at that corner of that column and if it starts to crumble and crack there, I'll drive around instead of under the bridge!

HARTLEY So the fixed column is the one at this end of the ...

CLOUGH The downstream centre one.

HARTLEY Oh yes.

CLOUGH So have a look as you go under. And it will be the downstream side that will go, I am sure it will fail in compression, and just in the corner of the "Y". You'd see signs of failure there long before it happened. Now it is 50 or so years ago now. Oh it is more than that – '59 when we finished. Oh it is 50 years!

HARTLEY Yes, 50 years this year.

CLOUGH 02 50 years this year. So in 50 years it hasn't happened so I doubt it will happen now. So probably if I had put my bottle there it would have remained there forever and it would have been all right. But that was one of our excitements. What else happened? I know when we erected our gantry over the bridge, it was by far the biggest gantry that had ever been built in the state before, and it was running out on a line of piles, a vertical pile and a raker pile, and a sort of a half cap underneath the rail and across the river. The crane driver had a little cabin right up at the top where the hoist was. When you stood down there when it was first built, gee it was high! When he went to go up the first time, he looked at me and he said, hey Harold, is this going to be all right going across the river? Don't worry, I said. I thought, gees. But it worked like a charm and we never had any trouble and it handled all the elements in there. The bridge has a span on the shore here and then that's got a little cantilevered span and then in the middle was a drop in span. So that's how it was put together.

04 Oh, the other excitement we had washow we could stress that long span with the cantilevers both ends on our trestles and get in to the ends of it to do the stressing. But the shore span here that went from here to here, you couldn't put it in position and then get in and do the stressing so what we had to do was to lift it up and stress it in a higher position and then lower it down. And the span in the centre, we had to stress just above where it was to go and then jack it down into position.

We had to provide that there was access under the bridge at all times, except when we were actually working there, and so we had a footway and a railway that went all the way across and in the middle was a 40 or 50 foot span which we had to remove to let the ferries and other boats through. At first, we were going to lift it up on some high columns, and then we thought, that's hard. We will just drop it down to the bottom, which is what we did, and we had a couple of hand winches there and we used to operate overnight. If somebody wanted to get through, we'd drop the span down and a couple of fellows would then sort of wind it up again. But what it meant was the trestles went all the way across except in the centre span, and there we had to have steel beams holding supports to support the truss in that position.

06 And what it also meant though was the supports there had to be four or five times stronger than the intermediate ones, so we had to have additional piles and the loads there were by far the heaviest we had. What used to happen was, because it was long timber piles and trestles, which were about 20 or 30 feet high, everything was a bit – I was going to say flimsy, but that is probably the wrong word – but what happened when we put the ten ton loads on them, they would always move, and we had to get them to wind up straight, but what we found, we'd put the element on it and leave it overnight and the next day it would sort of move half an inch the first day and a quarter of an inch the second day and an eighth the third day and, by the forth or fifth day, it was in a stable position. We would then move it back to where it ought to be and get them all lined up. And we were doing this one – I think it

was a winter's day, if I remember rightly – and putting these elements up and we measured them all the time as to how they moved and we were going through that, loading up the centre span. But what happened then, they'd moved a quarter of an inch the first day and then half an inch the second day and an inch the third day so, instead of slowing up it was accelerating.

HARTLEY Oh gosh.

CLOUGH 08 And I thought, Oh gee, so we started taking the elements off again. I remember we were doing this late at night, when it got dark, so we had to stop and we went home late and I was having my dinner, and I got a phone call. It was the master of the ferry and he said, what the hell's happened to this bridge of yours? And I thought, oh gee, the whole bloody thing has collapsed! I said, what's the matter? And he said, the bridge is still across and I can't get through. And I said, oh, is that all? He said, what do you mean, is that all? I've got a hundred people sitting on it – sitting on the ferry. He wanted to get through and he can't get through. So I managed to ring up someone and get them to go in – oh a couple of people – and lower down the bridge and he got through. But what we had to do was to beef up the temporary structure there enough to make sure that it didn't collapse. But essentially it went through without any serious problems at all and I think it is still there as good as the day it was built.

HARTLEY How did you get on between the Australians and the Danes? Did you both understand each other?

CLOUGH Well, it depends on at what level. Leif Ott Nilsen was a Dane but very Germanic.

HARTLEY He likes things done properly.

CLOUGH 10 Yes. For instance, he always called me Clough, whereas in Australia, everyone from the boss down, calls you by your Christian name. But the Germanic way is you're there and I'm the boss and you're my 2 i/c, but you're Clough. And the interesting thing about it was he had another Dane come over to him with the name of Schou, Bent Schou, and he was the accountant. Very smart, a great guy. We are still very close friends and have been for 50 years. And Leif Ott Nilsen never understood that calling me Clough was just inappropriate in Australia – it would be like me now calling you Hartley. Do this, Hartley. Do that, Hartley. But Schou understood completely, so he'd call me Clough too, just to try and rile me, so I always called him Schou – and we still call each other Clough and Schou fifty years later because that's the way it was. But essentially at working level the Danes and the Australians got on particularly well and, as I said, I am still very friendly with several of the Danes – Schou in particular, and he comes out to visit us, or has up until – he has got a bit older now – but Leif Ott Nielsen was always aloof, you know. He used to ...

HARTLEY He was sensitive that he was the boss.

CLOUGH 12 Very! So he used to get himself into awful trouble in Australia. I remember once, we went down together to Albany for some reason – I've forgotten what it was now – and we were staying at ... what's that hotel? I've forgotten now. Anyway, there is sort of a posh hotel in Albany where we were staying, and we came down to dinner and we were sort of told it was formal, so I was there in a suit and tie, formal tie, and Leif Ott Nilsen came down in a very smart slacks and a perfect jacket with a scarf, cravat, but an open neck shirt and then they stopped him and said, Sir, you can't come in because you don't

have a tie on. He was the best dressed fellow in the place. [laughter] They stopped him because he didn't have a tie! Oh, he just couldn't get over it!

HARTLEY What about the Maunsell man that came out from England for it, the Resident Engineer.

CLOUGH Godfrey. Godfrey was the Main Roads bloke. Birkett was the director of Maunsell. I've forgotten. I will think of it before our next one.

HARTLEY Some of the English consultants are inclined to be a bit class conscious.

CLOUGH 14 Yes, well. It was funny. He and K. H. Sørensen got into discussions over the design of the bridge and the great thing about Christiani and Neilsen, all their engineers were also designers, because they were a designing company, whereas in England they tended to be – you were either a consultant and designer, or you were a constructor, and the two never mixed. But all the Danish engineers were really good designers. Leif Ott Nilsen was a great designer, but Sørensen was probably better, and anyhow, they were sitting in his office one day with Sørensen and he was pointing out one of the things where the design wasn't right, in his opinion, and he said, generally it was a very good job but, you know, old Maunsell is really past it now. He has passed his prime. Oh! Did Birkett take off but of course Sørensen was at an age and experience where it didn't particularly care and so we had some tense times there for a while.

Another thing that happened was when we were prestressing, we started prestressing, the anchors for the post-tensioning, they were all in the anchor blocks at the end of each beam and the anchor blocks were almost solid concrete and solid steel because – someone said they were designed on the canary cage principle. If you put a canary into the reinforcing, if it could get out you have got to put in more steel. [laughter]. The main stressing on the Narrows is high tension, it's got heavy high tensile steel – I've forgotten the loads that we were putting on it now, but they were significant, and we started to get some cracking in the anchor blocks and I remember Leif Ott Nilsen got onto it and he looked at these cracks and he went away and came back and said, oh, look I've just checked the design. We've got all this steel in, but it is in the wrong places. There's also bending in the anchor blocks and they just haven't allowed for it. So we had to recast quite a few of the anchor blocks because the design wasn't right.

HARTLEY That doesn't happen very often, does it, the contractor says that the consultant's design is wrong.

CLOUGH 17 No, no. You've got to be brave.

HARTLEY Yes.

CLOUGH They don't take to it kindly. Mind you, that's what happened with the Westgate Bridge and they didn't take any notice and the consultants weren't there. They were really wrong. What happened at the Narrows, when we were about half way through it, the Main Roads got Maunsells to design those footbridges that go down the Freeway.

HARTLEY Oh yes.

CLOUGH And they've got a curved approach and then over the Freeway and down and once again they are prestressed concrete, and three quarters of the way

through the Narrows contract, they called tenders for those and by this time we were just completing the National Mutual building, so I got the fellows there to bid on these footbridges, and we won that. So as we were working here, and they were also working down there and that turned out to be a very satisfactory contract for us. Subsequent to that, when we had just finished the Narrows and most of the Danes had gone home and we took a contract to pull out all the timber piles and clean up the site. And while we were doing that, we won the contract to build the foundations for the Muja Power Station, and that was also a very long term and successful contract. But what it meant was, from that time on, most of our work was engineering work rather than building work, whereas prior to that everything we had done had been building work. And what happened, immediately after the Narrows, one thing was the Ord River Diversion dam and the government called tenders for that and that was on a very remote site up in Kununurra and Christiani and Neilsen and ourselves agreed we would tender that together and I remember on that we had a fifteen per cent interest. [laughs]

- 20 By that time Christiani and Neilsen had an office in Malcolm Street in Perth and I used to work out of that. We won the contract for the diversion dam and then we won the contract for the bridge over the Dunham River not far from the dam.

CLOUGH Yes. And I remember I did all the work on the estimate and we bid it and won it. But then Leif Ott Nilsen was very conscious of security.

HARTLEY Security from whom? On site, or between companies?

CLOUGH No, in other words, estimates. I did all the estimates for the bridge and we bid it on that and we won it, and then immediately the estimate became confidential and I wasn't allowed to look at it! [laughter] How nutty can you get? But that was ...

HARTLEY That's a funny way to run a joint venture, isn't it.

CLOUGH Oh, he was impossible.

HARTLEY This was in the north west, was it? This one?

CLOUGH [inaudible]

- 23 Anyway, we got the contract for the diversion dam and that meant setting up a camp and so on in Kununurra and it was really the first time that anyone had done a remote construction job apart from Public Works and Main Roads Department. And the Main Roads guys, in those days, used to live in tents.

HARTLEY Yes, atrocious conditions.

CLOUGH Atrocious conditions. So we had a breakthrough where we, at least, put them in buildings. If I remember rightly, we had four fellows to a room, no air conditioning, and I remember we discussed it with the unions and they insisted that we must have hot water, and what they didn't realize what it was like up there ...

HARTLEY It is all going to be hot.

CLOUGH We were taking the water out of the Ord River and pumping it in a pipeline about half a kilometre to the camp, but with the pipeline on the surface, so ...

HARTLEY They got their hot water.

CLOUGH It was cold water that they needed, not hot. The water that came out when you first there was almost unbearable hot and the water, in any case, it is so hot up there the water was always warm. But we worked – oh, it must have been two years – on the diversion dam.

HARTLEY They were very tricky units, weren't they, on the diversion dam? How did you move them, the gates?

CLOUGH 25 The gates. Well the gates were fabricated by Vickers Hoskins, I think, and they were all riveted. The last riveted, steel structures, I think, built in Australia. But they pinched the design from gates that had been built somewhere else.

HARTLEY Wasn't it India? Somewhere like India, anyway.

CLOUGH Yes, it was India. And a fellow called John Lewis was the leading light and the designer of it and he had the drawings of these gates but, of course, they were 20 or 30 years old and they were all riveted, so we built riveted gates. But they were all fabricated by Vickers down here in Perth and shipped up, carted to site. I remember when the riveters were all tough nuts and have you seen the way they have to heat the rivets before they drive them?

HARTLEY Oh yes.

CLOUGH 26 So down on the ground somewhere, they've got this fire going and they have the rivets in there and they get them red hot, oh white hot at times, but then they'd pick them up with a tong and then they toss them up to where the fellow has to catch it, you know, catches the rivet and then his mate picks it up with a tong and puts it into the hole and bang, and they rivet it. And I was up there one day with Leif Ott Nilsen and these fellows were up there doing something that he didn't like and he yelled out to them to do something else and they just told him to get stuffed! He was furious! But what does he do? I mean, you have to learn as a boss in construction, if you are going to yell at blokes up on a scaffold somewhere, be careful because you've got to get up there to really talk to them.

HARTLEY Yes, and they are in a potentially dangerous position.

CLOUGH Yes. It drove him nuts.

HARTLEY So you did everything on site, as well as the fabrication.

CLOUGH No, well, because we had to take them up piece by piece, and no piece could be more than a ton or so, they just were all taken in pieces and riveted together. But, during the wet, when the Ord's in flood, we actually left the site. We all came south during the wet, and then we went back and completed the work on the river and then the gates were erected. But we had a big concrete plant up there, I remember. Poured a lot of concrete.

28 As a job, it went well, and we had quite a number of people on site. Christiani & Nielsen had a lot of people on site. But that was the last job we did together because, by that time – it must have been in the early '60s – and Christiani & Nielsen had been out here for on four or five years and they knew enough, as much then about Australian conditions and costs as I did and after that they said, well why do we want to give this bloke fifteen per cent when we can do

it ourselves, so we parted company. And they stayed for probably another five or ten years and then ran out of work and left and then went broke in Copenhagen. They had a very big office in England, and then they all went to England. And then they went broke in England and then they just disappeared off the map. They don't exist anymore.

HARTLEY Even the best ones come and go.

CLOUGH Yes. They all come and go. You've got to understand that.

HARTLEY So it must have been one of the first big jobs in the north west.

CLOUGH Yes.

HARTLEY It must have been quite a shock for people who were not used to those conditions. Especially in the wet.

CLOUGH In the wet, yes. It is not very pleasant in the wet. The first time I went up there was when we were tendering on the project. And there was nothing at Kununurra and the Public Works Department, I think it was, had set up tents where Kununurra was going to be built, under Kelly's Knob. Have you been up there, under Kelly's Knob?

HARTLEY Oh yes, yes.

CLOUGH 30 We were up there either just at the end or just at the start of the wet, I've forgotten now, but a storm came through one night we were there and I have never seen lightening like it. And it was almost daylight and the lightening was all coming down and hitting Kelly's Knob and, gee, it was spectacular, and raining like hell. In the tents, if they stay up, you know, you are off the ground enough not to get wet.

HARTLEY The Cockburn Cement job that was also with Christiani & Neilsen, wasn't it? That was quite a big job, wasn't it?

CLOUGH Oh, was that the one in Cockburn?

HARTLEY Yes. It wasn't the whole of the cement plant, just part of it.

CLOUGH What was the value? It couldn't have been much.

HARTLEY Oh 200,000.

CLOUGH Yes. No, it was not one I remember. But, effectively, at that time we were just working together with Christiani & Neilsen. I had an office in their office and when something came up that they were interested in, we would do it together. Fortunately, we always retained a separate entity, too. In other words, we always had work going on where they weren't involved, and up until the Ord River Dam, I think everything they did up until then they always did with us. But we did things where they weren't involved, and if it hadn't been for that, when they walked away, I would have been left high and dry, but we had an ongoing organisation and we competed. Yes.

HARTLEY So what happened to your father? When did he retire?

CLOUGH Oh, he died in '59, about two or three months before the Narrows Bridge was finished.

End of Tape 4, Side A***Side B of Tape 4 is blank.******Tape 5, Side A******Interview on 24 April 2009 at Nedlands***

minutes

- HARTLEY 00 I am talking this afternoon with Mr Harold Clough on 24th April 2009. Good afternoon Harold.
- CLOUGH Hello Richard.
- HARTLEY Last time we were talking you had just finished your Narrows Bridge work and I was just going to ask you how you came to joint venture with Royal Netherlands Harbour Works on Hamersley Iron's first jetty.
- CLOUGH I should make clear that before that on the Ord River Diversion Dam our joint venture partner was Christiani and Neilsen, a Danish company.
- HARTLEY Yes.
- CLOUGH 01 After we had finished the Narrows Bridge which was our first contract with them, we went on to do some silo foundation work at Geraldton for Cooperative Bulk Handling before we were successful in obtaining work on the first stage of the Ord River Diversion Dam at Kununurra. Some time after that, which would have been in the mid 1960s, we did our first joint venture with The Royal Netherlands Harbour Works out of Holland for the first jetty for Hamersley Iron at King Bay.
- That was the start of a joint venture which still continues to this day. The Royal Netherlands Harbour Works have had three or four different owners – no, two – and Clough has become a public company. Clough is still joint venturing with The Royal Netherlands Harbour Works. It has been a very successful joint venture.
- CLOUGH And after we completed the first jetty for Hamersley Iron for the first iron ore exports, we went to Barrow Island for WA Petroleum to build a submarine pipeline and a marine terminal on Barrow Island also in a joint venture with Royal Netherlands Harbour Works.
- HARTLEY And that was your first offshore oil and gas project wasn't it?
- CLOUGH 03 Yes. It was a submarine pipeline. I think all our competitors [put in] bids to do it traditionally with a lay barge in which you put the pipes on the barge and feed it off the back of the barge as you pull the barge along and let the [welded] pipes go down as a stringer to the bottom. We did it by assembling the strings of pipes and welding them on shore and then running them down a railway and floating them out to sea and then sinking them in sections of several hundred metres long.

Our client was very apprehensive about our methods and said that we seemed to think it was a plumbing job but what we found out was that our total price was less than the mobilisation cost of the lay barge. *(laughter)* It was a very cheap price.

HARTLEY You could have doubled your price and still got the job.

CLOUGH We could have easily doubled our price and still had the job.

We had a very good welding team. We picked the best welders at King Bay and took them across to Barrow Island. But pipeline welding is different from traditional welding. A large amount of it consists of under-hand or over-head welding.

- 05 The client had a non-destructive testing organisation which tested every weld initially we ran into a lot of trouble because something like 20 per cent of the welds was being rejected. When a weld got rejected it took two or three times as long to fix it as it did to weld the first one as it had to be cut out. Consequently the welding programme fell behind. The client was completely unsympathetic and said that if you do not fix it we will cash your two year bond.

So we chased all over Australia for a pipe welding crew. Finally we ended up with a crew run by a fellow called Forshaw, out of Queensland. We flew him and his crew over to Barrow Island and they got off the plane and immediately did their test welds and the non-destructive people rejected them. *(laughter)*

They said that they would have a sleep and were probably tired after the journey. So they re-did the tests again the next day and failed them again. So I said to Forshaw that their contract provided that if they didn't pass the test they would have had to pay for their own fare. So he suddenly realised that he was up for the fares for all his crew and got angry and said,

'You don't think I am silly enough to fly all my people from Queensland here if I didn't think they would pass the test.'

And I said, 'Well you certainly fooled me.' *(laughter)*

- 07 So we were then in a real jam as time was running out, so finally we hired a crew from California and flew them out to Barrow Island. And what we learnt was that these welders were no better or worse than any of the Australian boys but they were a lot more experienced. So when the non-destructive people rejected their welds they argued with them and made the non-destructive people cut out every weld they condemned and show them where the fault was.

What we found was that the non-destructive testing people were rejecting about five times more welds than they should have been. When they went to cut them out there was no fault. So we then got onto a relationship that worked. Not that these welders were any better than the others but they were experienced enough not to be fooled by these non-destructive testers.

These people were being particularly conservative because they saw that that was their job. If they didn't reject welds the client would wonder why they were paying them so much.

HARTLEY Yes. I see what you mean.

CLOUGH So, is there any particular place you want to go to from there? Actually the biggest contract we had ever done before then came up at that stage.

HARTLEY 09 Yes I was going to ask you about that.

CLOUGH It was a very low frequency United States Navy [Communications] Base.

HARTLEY Twenty million dollars is an awful lot of money, isn't it?

CLOUGH Twenty million in those days would be almost two thousand million today. The US Navy built this communications base at Exmouth Gulf. They set up the site and put in the port in the Increment 1 but we did Increments 2 and 3 and we worked with the Koppers Company, out of Pittsburgh, Pennsylvania. We worked for the United States Navy.

The Increment 1 contractors previously had given the Navy a very tough time so they sent their toughest inspectors out to Australia to look after us and they certainly gave us a particularly tough time. So the cost of the project escalated out of sight, and we almost immediately began to lose significant amounts of money.

The only thing that stopped us from going broke was that I had written the best joint venture contract that I have ever written, in so far as I had limited our losses to a relative amount, I think it was 15 per cent and Koppers had 85 per cent of the contract.

11 It was compulsory under the terms of the agreement between Australia and America that the contract was taken by a joint venture between Australian and American contractors. So they needed us. I think out of the twenty million we reckoned that we were going to make a million dollars profit but actually out of that we would get 150 thousand. I had limited our losses to 150 thousand and we had lost that amount in the first three months and after that it was all Koppers loss.

HARTLEY What was Koppers' speciality?

CLOUGH Koppers' speciality was making coke ovens for the steel industry.

HARTLEY Really?

CLOUGH They were originally a German company. During the First World War they were taken over and they became an American public company. They were a very conservative, Pittsburgh-based company. Pittsburgh is a very conservative part of America. When I told them that we were being screwed by the American Navy they said, 'Not our United States Navy'.(laughter)

After about a year they finally came to the conclusion that the Navy was being completely and utterly unreasonable. After that they were just legal. They went into litigation with the Navy. They went into litigation for five years and we won hands down. We finally finished up making money on the contract. It was a very tough contract.

HARTLEY 13 You wouldn't want to do another job for the US Navy after that.

CLOUGH No (said slowly).

The sort of work involved in half of our contract was putting up all the buildings and offices. There was much more building work than there was engineering work. Under the contract there was a clause to say that the client could ask for samples of any material that was being installed. That's very common because it is hard to specify things like basins and baths and so on. The Navy wasn't allowed to specify a specific brand or make because that was deemed to be anti-competitive and you can't describe the shape of a basin you want, so a supplier had to provide them with a sample.

It was alright to ask for samples but the Navy had interpreted [it as meaning] that for every single item the supplier had to provide a sample. We had to provide a sample of one inch nails, two inch nails and three inch nails and for every size of timber we had to supply a sample. So we asked our timber supplier, for example, to provide samples to give to the Navy. The supplier gave them, say, thirty pieces of timber. So then the navy inspector would walk around. There were no knots or cracks in the sample piece but there were knots and cracks in the pieces we were getting. So as a piece didn't comply with the sample he rejected it.

- 15 One of the things which I remember was the specification for coat hooks. The coat hooks that were specified had to be a certain distance out from the wall and we couldn't buy a coat hook to meet the specification anywhere in Australia or in America.

HARTLEY I suppose they wanted a special size to hang navy caps on.

CLOUGH So we had to have special coat hooks made.

We had to put in a lot of room air conditioning. Once again they couldn't specify a 'Carrier' or a 'Westinghouse' or another regular make of that size. We believed that the fellow sitting in San Diego writing the specification had decided that he had to be fair to everyone. So he pulled down a 'Carrier' specification for that size unit and specified that motor. Then he pulled down a 'Westinghouse' and quoted a Westinghouse compressor to go with that motor. Then he would pull down a specification from another maker and would specify a part from that one. So he would put all three together in the specification. Consequently we couldn't buy on the market anything that met the specification. So it looked at one stage like we would have to get every air conditioner specially made just to meet the Navy's specification.

It was a very, very difficult contract because the Navy read every word of the contract literally and insisted that we follow it absolutely.

- 17 In many cases they specified things that didn't work and when we told them that one wouldn't work they said that we would have to apply for a variation. They said that not only would we get no payment for the variation but we had to take full responsibility for it. So in the end, although we could see that stuff would fail completely, we just went ahead and built it and when it failed we said 'Well what do we do now?' - instead of fixing it up before we started.

CLOUGH²

1. Mr Clough has requested that the remainder of Side A of Tape 5 (Interview on 24 April 2009) be deleted from the record of these interviews. 12 minutes of tape (from 17½ mins to 29½ mins) have been deleted.

End of Tape 5, Side A***Tape 5, Side B***

[Written introduction by Mr Clough:

We had a 50:50 joint venture for the Harriet Oilfield with Bechtel Corporation to design and build a pipeline from the well head to a gas treatment plant on Varanus Island where the gas and liquids were separated. The clean gas was piped ashore and the liquids were shipped through the Barrow Island submarine pipeline.]

minutes

CLOUGH 00 The joint venture with Bechtel was a 50:50 one but Bechtel insisted on providing the project manager and they sent out a fellow who was particularly good. He got all our people on side and got them all fired up and had them working 10 or 15 or 20 hours a day. There was just a tremendous amount that had to be done simultaneously. As we were designing things we were ordering the materials almost at the same time. It was a very exciting time.

Half-way through a vice-president of Bechtel came out to visit the site. He was very critical of his project manager because he wasn't putting in all the reports that Bechtel required him to put in. (laughter) He said, 'I'm going to replace the project manager'.

I said: 'No bloody way. He's the best project manager we've ever worked for. If he is not putting in enough reports I don't care a stuff about your records. He is getting the work done'.

So we had a stand-up row about whether or not he was going to take this fellow off the site. Finally I agreed that he could send out another project manager provided he sat there and didn't interfere. So we got another project manager and the fellow we had continued to do all the work while the other one didn't do anything ...

HARTLEY Except write reports.

CLOUGH 02 Except write reports. And he was bloody hopeless. He was probably a very good report writer but the fellow we had first was one out of the box. He was really a gift. He had everyone working together. He knew what he was doing and everyone else knew what they had to do.

HARTLEY Someone who comes in from another organisation and is able to do that is particularly valuable.

CLOUGH Well, that is what really kicked us off into the oil and gas business. We particularly liked working with Bechtel. I worked for them in the States after I graduated from the University of California.

HARTLEY You must know quite a few of them personally.

CLOUGH Oh, yes. It's good.

HARTLEY The next thing I have on my list is Petrosea. Would you like to talk about how you came to acquire it?

CLOUGH Let me tell you the story about Petrosea. (pause) One of the projects which we haven't talked about was the work on the Standard Gauge Railway which was done in the early 60s.

HARTLEY Oh, yes.

CLOUGH Let me talk about that for a bit before we go on.

HARTLEY Yes, certainly.

CLOUGH When the Government decided to build a standard gauge railway... Have we chatted about this before?

HARTLEY 04 No, not about the Standard Gauge Railway.

CLOUGH The Western Australian Government wanted to build a standard gauge railway to the east coast. That meant that it had to build a new one to Kalgoorlie. The Western Australian Government Railways was involved through the Western Australian Government and the Federal Government railways was involved because the Feds. were putting up most of the money and they employed Maunsell and Partners as consultants.

The new railway effectively started from Midland Junction and it went up ...

HARTLEY through the Avon Valley...

CLOUGH ...through the Avon Valley, which was a completely new route. For the first stage we bid with Perron – Stan Perron had an earth moving company – in a joint venture with them, with Perron doing the earthworks and we were doing the bridges and culverts. There was a fellow called Bob Elliot, who graduated a year before I did, who was working on the quantities and we worked together.

06 As you go up the Avon Valley in one place there is a very large hill in the way. The difficulty with railways is that you are limited to a grade. They always set a grade, a maximum grade which you are allowed, which determines the maximum load which a particular locomotive can pull. In this case the grade was 1 in 200. If you look at a grade of 1 in 200 it is difficult to tell which way it slopes, it is very very flat.

So as you go up the valley you come to this big hill. Maunsells decided that it too expensive to make a big cutting so they designed a bridge to cross the river. The route crossed the river and then went along some flat country and then crossed back again. So there were two big bridges.

We went ahead with Perrons and estimated the cost of the bridges and culverts. With the two bridges included the cost of the bridges and culverts was almost as much as that of the earthworks. When Bob decided to have a look at what it would cost to put a cutting through the hill and we decided that we could put a cutting through the hill for the cost of about one bridge, it was clear that it was much cheaper to build a cutting than two bridges.

I think this is a problem which consultants always have with designs. They don't know what the costs are. As contractors you have to know your costs.

08 So we put in an alternative tender. We put in a conforming tender with two bridges and also the alternative tender with a cutting and no bridges. We

were the cheapest by a mile. The client looks at this and says, 'Gee, that's a good idea. But it is unfair for one contractor to bid on a cutting and no bridges and everyone else bids on two bridges and no cutting'.

HARTLEY Doesn't it show that one contractor is more intelligent than the others?

CLOUGH That's what they should think but that's not what they did. They stole our design. Maunsells redesigned it with no bridges and a cutting and they went out to tender again. We thought that was completely and absolutely – it was – unethical. But what do you do?

Actually at that time, Thiess Brothers, who were based in Queensland at that stage, decided that they should come to Western Australia, so they made an offer and bought out Stan Perron. So Stan got a bucket load of money and Thiess took over Perron.

Stan went on to make more money partly because of aspects of the deal. Thiess at that stage were agents for Toyota who had just started to introduce cars into Australia. As part of the deal Stan got the Toyota agency for Perth and then went on to obtain other agencies and that the basis of his multi-million dollar fortune.

- 10 They re-called tenders for the Avon valley work and Thiess took over from Stan Perron. Bob stayed on with them. They appointed a new manager, called Dick Sukias, spelt SUKIAS. He had been working for Gammon in Singapore. He was a Brit from Singapore. I think he came down to build Fremantle Railway Bridge. He started working for Thiess and this was his first job. Thiess was a traditional earth-moving contractor.

We prepared a new tender on the basis of the re-design, cutting out the bridges and putting in the cutting. Our share of the contract came down.

- 12 There were half a dozen bidders. We put in our bids and got called to Melbourne where the Federal Government railway people had their head office. Maunsells and the state railways men came over. I went over with Bob Elliott, Dick Sukias, Stan Perron and a couple of other people for our side of the negotiations.

Maunsells had received all the bids. We had put in a comprehensive bid. We had quite a lot of conditions because the spec. was still a bit messy. We started negotiations and we came up to the first point and Maunsells said, 'Oh, we don't want this condition. Nobody else has put it in. Your price is this'. One of the Maunsells guys had a big spread sheet and obviously he had all the contractors and all their prices for the various items and he could compare our price for every item with every other contractor's price. As we started negotiations about every condition, he would say, 'Oh well, your price is way above everyone else's. You can't have that condition'.

- 14 It was a bit like playing poker when the other side can see your hand. They had all the information. Dick Sukias who was leading the negotiations would say, 'Oh, well, we withdraw that condition. We withdraw that condition'. So we were giving away money at every turn. Then we came to one particular condition and the client said, 'Look we need to talk between ourselves about this. Can you go to another room. We will send a couple of Maunsell's people with you and you can discuss some of these other items. Then you can come back. This is a big issue'.

So we went to another room and we were sitting on one side of the table and they were sitting on the other. Once again the Maunsell's guy had his big spread sheet and I was sitting opposite him but this time he had his back to a window (laughter). When he held his sheet up I could look through it and see it in a mirror image. I remember I had a big bill of quantities in which all the quantities are listed and you have to price every item. I had this bill of quantities on my knee and I was looking at this sheet and I could read all the contractors' names. Then I could see all the tender prices on the list but reading it through the paper and backwards.

As I sat there I took out a pencil and in the margin of the bill of quantities – I could see our price and I knew what our price was, then there was Leighton's and those of half a dozen others. So I was writing all these things down and an issue came up and Maunsell's guy said, 'Look we should look that up in the bill of quantities. Harold, can I have your bill of quantities?' (laughter) 'No way'

- 16 We kept on going and I made my list of all the tender prices. Then I checked them all. We were 5 per cent below the lowest. And here we are giving away all these things. So I got up and said, 'I've got to go to the toilet'.

Then I said 'Dick, you've got to come with me'. He said, 'I don't want to go to the toilet'. 'Oh, you've got to come'. They thought 'Oh, he's a queerie that bloke' (laughter).

When we got outside I said, 'Look, here's a list of all the prices and our price is five per cent below the next lowest'.

He said, 'Where the hell did you get that from ?'

'I read it through the sheet when the bloke was holding it up'

Then he called out Stan Perron and the others and we all debated this a bit. Then we went back into the meeting and the whole tenor of the meeting changed completely. Every thing which came up was, 'Extra.... Extra... Extra'. So we added another three or four per cent to our price. We were successful. We won the contract which just about made up for the fact that we didn't get it the first time.

I remember, years later, I caught up with the Maunsell fellow who was in charge of it and I said, 'Do you remember when we were in Melbourne ... Do you remember when you held that sheet up with all the prices on. I was sitting on the other side and there was a window behind you so I read them all'

- 18 He said, 'We wondered why there was a complete change. You know, you were very lucky because Leightons, I think, had put in an alternative and the price that was on that list was their conforming tender and when you put your price up we very nearly took that one.' But it didn't happen.

Now, where we up to before we went back a bit.

HARTLEY

We were talking about offshore oil and gas work before we got back onto land and. hydrology. Were there any other Standard Gauge Railway contracts which you were involved in?

CLOUGH No. I don't think so. There were a couple of bridges at Northam but we didn't get them. In fact I think it was Christiani and Nielsen who did those.

HARTLEY We were just starting to talk about Petrosea.

CLOUGH 20 Oh yes... *(Pause)* Thiess, Bob Elliott and Petrosea, that's the association. After the Standard Gauge Railway Thiess bought out a company called Petrosea, based in Singapore but working mainly in Indonesia, Malaysia and Hong Kong. It was started by a couple of Americans who had an association with one of the huge American oil companies which was working in Sumatra in the oilfields there. Petrosea was providing labour and equipment for their rigs. Thiess wanted to go international so it bought Petrosea and Bob Elliott was sent up to be their first manager. At that time we started working in Saudi Arabia and I was going through Singapore quite regularly and looked up Bob when I was there. So we kept pretty closely in touch.

22 During the 1980s Thiess was taken over by CSR. CSR had gone into the coal industry. Thiess had a lot of coal mines in Queensland and CSR wanted to buy their coal mines. CSR decided that instead of just buying their coal mines they would be better off buying Thiess, the contractor that owned the coal mines. So they did that and transferred the coal mines out of Thiess into CSR and sold Thiess, the contracting company, to Hochtief, the big German company which owned Leightons. So Hochtief bought Thiess and then sold Thiess into Leightons, which they also controlled. Leightons worked the biggest confidence trick in the industry by telling all its clients that although Thiess and Leightons had a common owner they could work in competition and be competitive. How they get away with it is still a mystery to me but that's what happened .

HARTLEY That's still the official line isn't it?

CLOUGH Still the official line. And now they have taken over Hollands and they say that Hollands, Thiess, Leightons and several other companies all compete with each other. Absolute nonsense. All report to Wal King and he decides who is going to get what. An absolute disgrace.

So CSR sold Thiess's Australian operations to Hochtief and Hochtief put them into Leighton. They didn't sell Petrosea which Thiess owned in Singapore because Hochtief didn't want it as they didn't want to work in and service those places.

24 Bob carried on managing Petrosea but working for CSR and in the mid 1980s he gave me a ring and told me that Petrosea sat somewhat uncomfortably in the CSR conglomerate. He said, 'CSR wants to sell it. Why don't you buy it?' CSR wanted 30 million US\$ for it. I said, 'Come off it, Bob. That's more than my company's worth. I like the idea of owning Petrosea but I can't afford that sort of money'.

I didn't hear any more for 6 months or a year, then he rang me up again and said. 'I think there's an opportunity for you. There's an Indonesian businessman called Adrian Zecpa who lived in Hong Kong'

(Pause while Mr Clough searches for a reference.)

HARTLEY Never mind we can put it in later.

minutes

CLOUGH 26 This Indonesian had joined up with an American, who was a contractor, and they had put in a price to purchase Petrosea which had been accepted. (Further pause) The price was about 23 million. He said that the American had run into trouble and couldn't raise the money. The Indonesian was looking for a partner who could run the business.

Bob said, 'I have recommended you. Why don't you join him with eleven million dollars'. So I went up to Singapore and I met the Indonesian and he was a nice guy. He said, 'Look we bid 22 million and CSR accepted that but I could have got it for much less. I agreed on 22 so I am going to find it hard to go back with another price. We will have to withdraw our bid. Why don't you go and see if you can't get a better price and I will join you later.'

CLOUGH 28 I started discussions with CSR and discovered that Petrosea had 5 million dollars worth of debts. I finally did a deal to buy Petrosea for 15 million dollars instead of 23. We agreed to pay CSR 5 million dollars immediately and to assume the 5 million dollars worth of debt and to pay the other 5 million over the next 5 years. We agreed on that and I went back to the Indonesian and said, 'Boy, have I got a deal for you' and told him what I had done. He agreed that it was a really great deal but then he said, 'Now I have got a problem'. He had just agreed to set up the Regent hotel chain with hotels throughout Asia and he said, 'That's taken every cent I've got'.

I was then situated where I had got this commitment to buy Petrosea and didn't have my partner. I had already paid the \$5 million so I was committed. Peter Knight, one of our top executives, agreed to live in Singapore to run it. (Pause)

30 The late 80s were a particularly tough time in Australia. It was a tough time internationally. I remember we were losing money with Petrosea and we started losing money in Australia. In 1987 I would have given Petrosea away if I could have, but when things are losing money they have a negative value. We had to pay our tax and our executives. Let's say things were tough.

But then in 1988 there was a boom on the stock exchanges of Hong Kong, Taiwan and Singapore.

End of Tape 5, Side B

Tape 6, Side A

minutes

CLOUGH 00 The markets in Asia were all booming in 1988 and a lot of money was coming in. The Indonesians in Jakarta realised that they were missing out. They had a stock exchange in Jakarta but it was pretty much dormant because there were so many restrictions that there was no trade. They decided that they were missing out on all this money which was pouring into Singapore, so they changed the rules and they set out the new rules on which you could list companies.

One of the rules was that you had to have been established five years with accounts showing profits before you could list. That cut out most Chinese companies which did not keep accounts. You had to have paid five years of taxes and that cut out all the Indonesian companies as they never paid taxes (laughs).

More by good luck than good management Petrosea satisfied the criteria, so we decided that we would list Petrosea. We were allowed to issue new shares in the company equivalent to half the shares which we owned. So once we had issued new shares we would own two thirds of the company. So we effectively issued shares to a third of the company worth 30 million Australian dollars.

- 02 We floated this company on the stock exchange. It was five times over-subscribed (laughter). The brokers were holding 150 million dollars of the money people who wanted to invest in Petrosea.

I said 'Don't disappoint them. We'll take it all'.

They said, 'Oh no. It doesn't work that way'.

We finished up getting 30 million dollars which valued the company at 90 million dollars of which we owned two thirds. Even when the money was in the bank I just couldn't appreciate that you could make so much money so easily for so little effort. I would have sold the whole group for thirty million dollars in those days.

As it turned out Petrosea got the money and we issued a prospectus saying that we expected to do this amount of work and make this amount of profit and pay this amount of dividends. We did more work, we made more profits and we paid bigger dividends than we had suggested so the shareholders were pleased.

- 04 Petrosea ever since then has almost gone from strength to strength. Today it is a 100 million dollar company and has done very well.

The listing of Petrosea led us to consider listing Clough which we did in 1998.

HARTLEY

I hope we can talk about that another time. Thanks Harold.

End of recording on Side A of Tape 6

Side B of Tape 6 is blank.

minutes
